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Telephone: FLEet Street 3212 (26 lines)
Telegrams: Allangas - Fleet - London

Editor M. C. HYDE
Manager H. A. WILLMOTT
Director N. B. LIVINGSTONE WALLACE

Midland Office
Daimler House, Paradise Street, Birmingham. [*Midland* 0784-5]

Leeds Office
Permanent House, The Headrow, Leeds 1. [*Leeds* 22601]

Scottish Office
116 Hope Street, Glasgow C2. [*Central* 3954-5]

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CHEMICAL AGE

BOUVERIE HOUSE · 154 FLEET STREET · LONDON · EC4

GERMAN PLASTICS

PLASTICS production, on the average, has quadrupled. In some countries, notably those of Europe and Japan, plastics production has increased even more spectacularly. In the lead is the US with a present production of more than a million and a half tons compared with 126,000 tons in 1940. More recently, there has been news of Russia's plastics industry. Output there is estimated at several hundred thousand tons and Mr. Kruschev earlier this year indicated that this was to be considerably increased during the next few years.

The rapid growth in plastics production is undoubtedly due in the first place to the greater knowledge now available on properties of plastics and potentialities in application and in the second, to the quicker, more economic production of plastics goods compared with previously used raw materials. Plastics today fill an increased demand which could not be normally satisfied without their existence. In 1950 plastics consumption per head of the population was as follows: US, approximately, 10 kg.; Germany 8 kg.; France 3.7 kg.; Italy 2.0 kg.; Belgium, Luxemburg 3.2 kg.; Netherlands 4.5 kg., and the UK 4.5 kg. World production of plastics (in 1,000 tons) as seen from the following table shows the development of the industry since 1950.

World Production of Plastics
(in 1,000 tons)

	1950	1951	1952	1953	1954	1955	1956	1957
US	1,030	1,160	1,110	1,270	1,281	1,519	1,560	1,673
UK	135	160	150	216	278	291	312	355
Western Germany	98	167	175	226	309	395	484	589
Eastern Germany	30	35	45	60	70	80	100	120
France	27	40	35	52	84	96	130	163
Italy	13	17	25	51	76	97	116	134
Japan	26	40	54	32	907	158	243	*300
Others	141	181	306	343	195	454	355	266
	1,500	1,800	1,900	2,300	2,400	3,090	3,400	3,600

* Approximate.

Germany's plastics industry is widely connected with international trade. While it is intensively concerned with export, it is equally prepared to buy raw materials from abroad. The import of plastics materials in 1957 amounted to about 27 per cent of the export value. At the same time the value of these imports and the value of German plastics exports during the same period increased in about the same ratio, showing that Germany's plastics industry was able to develop its markets and outlets at about the same rate as the import of plastics materials into the country.

German Plastics Trade
(in DM1,000)

	1950	1951	1952	1953	1954	1955	1956	1957
Import	9,586	18,670	22,415	34,315	55,067	67,401	89,369	127,603
Export	29,716	101,693	101,820	146,229	219,369	297,632	363,459	427,269

West Germany's output and imports of plastics for the first half of this year were published in CHEMICAL AGE recently (see p. 601).

When the German production figures are split up into cellulose derivatives, condensation products and polymerisation products and their development noted for the period 1950 to 1957, there is reflected the general tendency for the new polymerisation products to take over a steadily growing share of the output increase.

German Plastics Production (in groups)

(in 1,000 tons)

	1950	1951	1952	1953	1954	1955	1956	1957
Cellulose derivatives ...	28	26	28	37	44	50	65	79
Condensation products ...	40	86	81	101	136	174	196	233
Polymerisation products	30	55	66	88	129	171	223	277
Total production ...	98	167	175	226	309	395	484	589

It is reported that no less than 53 per cent of the raw materials produced by the plastics producers for German home consumption in 1957 went to the chemical industry, where they were converted into varnishes, adhesives, films, synthetic fibres and textile or leather accessories. The above percentage does not include chemical fibres made from regenerated cellulose and also a large number of polyamide fibres. The percentage intake of plastics raw materials was: glues and adhesives 41 per cent; varnishes and paints 36 per cent; fibres, bristles, film base 8 per cent; rubber industry 7 per cent; and plastics products for paper and textile making etc. 8 per cent. Consumer goods industries and the plastics converting industry absorbed 38 per cent of the output of producers manufacturing plastics raw materals in 1957.

There is a remarkably large intake of plastics raw materials in West Germany's electrical industries (30.7 per cent) while the plastics converting industry takes the largest amount (43.8 per cent). The plastics converting industry operates at quite high improvement ratios, the value of plastics converted increasing by an average of 4.8 times in 1947. This explains the high turnover in the plastics converting industry which increased from DM693 million in 1954 to DM1,576 million in 1957. Of the total turnover of this industry 15 per cent can be considered as export production.

Of interest is price development in the plastics converting industry.

Plastics converting 1950 = 100	*Industry as a whole* 1950 = 100
1954 = 93	1954 = 116
1955 = 94	1955 = 119
1956 = 94	1956 = 121
1957 = 95	1957 = 124

The price index in the German plastics converting industry has thus risen by 2 points, while the general industrial index rose by 8 points. The figures indicate therefore that plastics products have not become more expensive. The rise in the price index for industry as a whole from 1954 to 1957 represents an increase of 7 per cent as against the 1 per cent increase in the plastics converting industry. A suggested reason for this stability in the price index for the plastics converting industry is that prices quoted by producers of plastics raw materials have shown a tendency to decrease. The industry is also a young one and is not tied down by conservative production methods: it can adapt its production rapidly to new materials and welcomes new methods and machinery which promise increased efficiency. It is also in the happy position of being able to absorb a possible rise in prices caused by increased demand.

To what extent products of the plastics industries are used alongside traditional materials is illustrated by reference to figures published for 1957 by the Statistical Office of the German Federal Government: Thus 184 million square metres plastic foil and leather cloth as against 132 million square metres furnishing fabrics, rubberised textiles and natural leather; DM92.5 million worth of foam products, as against DM60 million worth of sponge, loofah and foam rubber products; and DM91 million household and kitchen utensils made of plastics as against DM246 million of household and kitchen utensils made of metal or wood.

Western Germany's plastics industry at present is known to be in the midst of the development leading to the production of large parts, especially by the low pressure moulding process. In addition other converting processes, in particular injection, moulding, have been further developed so that in the near future production of large size parts by this method can be expected.

Visitors to the Brussels exhibition saw polyester or acrylic glass roofings over areas of many thousand square yards, proving that these plastics materials can be used as building materials. There are indications that German plastics manufacturers are likely to develop plastics for use in building. Their developments will be exhibited at the International Trade Fair of the industry 'Plastics '59' in Dusseldorf in October 1959.

FERROUS SULPHATE MONOHYDRATE

PRODUCTION of ferrous sulphate monohydrate from waste pickle liquor was reported recently (CHEMICAL AGE, 27 September, p. 517). A New York engineering company state that with their process the monohydrate can be recovered from pickle liquor. This is then roasted to produce ferric oxide and sulphur dioxide, the latter being converted to sulphuric acid. Crystallisation of the monohydrate is accomplished in this process with high thermal economy.

In a recently accepted patent of British Titan Products (British Patent No. 800,410), treatment of copperas, ($FeSO_4.7HO_2$) to provide ferrous sulphate monohydrate ($FeSO_4.H_2O$) is reported.

Copperas can be heated and dried to give the monohydrate, but a major problem is that in driving of the water of crystallisation a glassy scale is formed on the vessels used, which prevents further dehydration.

Spray-drying of an aqueous solution of ferrous sulphate has also not proved successful as there is more water than $FeSO_4$ is to $16H_2O$. For successful spray-drying water must be eliminated. In a concentrated aqueous suspension of monohydrate; the combined or free H_2O total is as low as $FeSO_4$ is to $7H_2O$.

British Titan's patent indicates that with a spray dry slurry a free-flowing product is obtained provided the total moisture does not exceed $FeSO_4$ as to $2.5H_2O$. For preference the moisture content should not be higher than $2H_2O$.

The preferred method according to the patent is to heat water between 60° and 100°C in a vessel fitted with a stirrer. Copperas is heated to bring overall $FeSO_4$ concentration in the total H_2O present to within the range $FeSO_4$ as to $7H_2O$ and $9H_2O$. Copperas and water are added intermittently to maintain the concentration with the temperature as stated. The slurry is bled off continuously to a spray-drier.

It is claimed that slurries have been prepared at 80°C within the concentration range $7H_2O$ and $7.35H_2O$. These slurries have low enough viscosities for easy stirring, pour smoothly and homogenously. The spray-dried product is stated to be suitable for feeding to sulphur dioxide furnaces either directly or mixed with pyrites.

With British Titan's large available quantities of copperas and their interest in sulphuric acid manufacture, it seems likely that more will be heard of this treatment of copperas. It is presumed that if the process is found to work adequately and economically, British Titan will have solved their problem of disposing of ferrous sulphate ($FeSO_4.7H_2O$) while at the same time obtaining a valuable return in the form of a suitable raw material for use in sulphuric acid production.

BHC INAUGURATE THIRD ETHYLENE UNIT

Largest Outside US—Will Double Existing Capacity and May Lead to More Investment

John Maclay inaugurates the new BHC ethylene plant. Centre is J. M. Pattinson, BHC chairman, and, right, C. H. Evans, general manager

A THIRD ethylene plant at Grangemouth with a capacity greater than the previous two was inaugurated on 17 October by Mr. John Maclay, Secretary of State for Scotland. Mr. Maclay performed the ceremony by driving the first pile of a major new project for British Hydrocarbon Chemicals Ltd.

Capacity for the production of olefins for the manufacture of petrochemicals by BHC will be more than doubled by this new installation which is scheduled to be completed by the middle of 1960. It may, therefore, said Mr. J. M. Pattinson, chairman, foreshadow a further programme of investment. Production of ethylene and other olefins started in 1951 and was expanded in 1956 with the completion of a second unit. The new plant will be the largest of its kind outside the US and will be considerably bigger than any other such plant so far planned in Europe.

The additional ethylene to be produced will enable existing ethylene utilisation plants at Grangemouth and the 'Rigidex Polyethylene' plant now under construction to be operated at full capacity. Sufficient ethylene and other olefins will also become available to enable a further programme of development to be undertaken. The new plant will be linked by underground lines with the existing plant on the other side of the Bo'ness Road. The provision of additional utilities and services is included in the scheme. The new polythene plant (capacity 12,000 tons a year) for which main contractors are Stone and Webster with Geo. Wimpey as sub-contractors, will use the Phillips low-pressure process. The range of coloured resins to be made will, it is said, be the first to be produced in the UK. The new ethylene plant will have a capacity of 70,000 tons, compared with the 30,000 tons-a-year capacities of the two existing plants.

Total Investment

With the completion of the project and of the polythene and phenol plants now under construction, the total investment by British Hydrocarbon Chemicals will amount to more than £30 million.

The inauguration was performed by Mr. Maclay cutting a tape which activated the pile-driving apparatus. For the occasion the company flew a party of distinguished guests by charter Air Work 'Viscount' from London Airport to Edinburgh. Coaches took visitors to the works for lunch and a tour of the existing plants and the extensions now under construction.

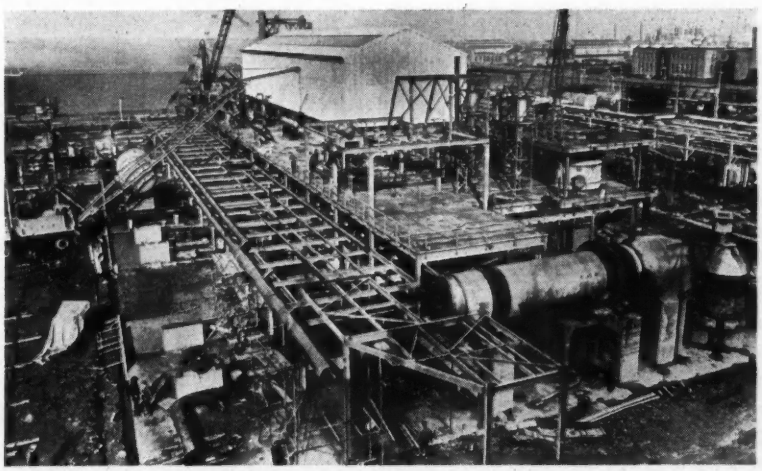
Among the guests were: Mr. Bernard Hickson, chairman, Association of British Chemical Manufacturers; A. L. Burgess, Board of Trade; P. A. Delafield, British Resin Products Ltd.; K. Finsterbusch, Stone and Webster Engineering Ltd.; Col. G. M. Glover, BX Plastics Ltd.; G. L. Hickson, Laporte Chemicals Ltd.; G. W. Hodds, Bakelite Ltd.; T. F. W. Jackson, Union Carbide Ltd.; T. I. Johnson-Gilbert, Coward, Chance and Co.; D. Kleeman, O. and M. Kleemann Ltd.; D. R. Mackie, Monsanto Chemicals Ltd.; P. D. O'Brien, Laporte Chemicals Ltd.; F. G. Pentecost, A. Boake Roberts and Co.; W. E. K. Piercy, Albright and Wilson Ltd.; L. E. P. Tylor, Coward, Chance and Co.; C. M. Vignoles, Shell-Mex and BP Ltd.; L. H. Williams, Shell Chemical Co. Ltd.

Guests were welcomed by Mr. Pattinson and Sir Graham Hayman, chairman of the Distillers Co. Ltd. In his speech at the lunch, Mr. Pattinson said that the units already in operation cost some £17 million; the completion of the two plants now being built would, with the new ethylene plant, bring the company's investment at the Grangemouth site to more than £30 million.

The new ethylene plant, which would be similar to the two existing plants, was estimated to cost, with its associated utilities and services, about £6 million. It would more than double the company's capacity for making olefins, the building blocks for the chemical industry. It might therefore foreshadow a further programme of investment. 'Indeed,' added Mr. Pattinson, 'we have adequate land available to enable any new plants to be sited in conformity with our rigid standards of safety.'

Mr. Pattinson declared that the UK petrochemical industry was almost entirely a development of the 12 years which had elapsed since the end of the war and he thought its growth had surprised everyone. At Grangemouth, BHC was now putting a greater quantity of oil into chemical manufacture each year than the quantity of crude oil processed annually at Grangemouth refinery before the war. At that time the refinery handled 250,000 tons of oil a year.

The company now employed about 1,200 people. Since the industry had always practised a high degree of automation the new programme would not add a very large number to the permanent operating employees. The new construction, however, would call for a labour force during the next two years of anything up to 1,000 on site. Since BHC began the company had been continually employing labour—almost exclusively Scottish labour, on a new



Reaction section of the Rigidex plant under construction for British Hydrocarbon Chemicals at Grangemouth. The plant is due to be commissioned on 1 March 1959

construction of one kind and another. Much of their material, such as tanks, pipeworks, vessels and machinery, had been and would be made in Scottish works.

Referring to the need for increased water supplies, Mr. Pattinson said that the local and national authorities had always been most helpful in planning to meet the company's growing needs. Participation by the Burgh of Grangemouth in the Loch Turret water scheme was expected, when that system was commissioned, to provide major quantities for the company's development. Meanwhile, it was understood that construction of part of the new trunk main would be used, with other new works, to ensure the increased water supply which would be essential in 1960 when the latest project was completed.

Replying, Mr. Maclay said that BHC, together with the BP refinery, which was expanded in 1954 at a cost of £15 million to bring capacity up to 2.2 million tons a year of crude oil, employed a labour force of 2,400 at Grangemouth. ICI Dyestuffs Division at Grangemouth employed more than 2,000. The new chemical industries in central Scotland had been able to offset declines in the light castings industry and in the shale oil industry. He described the petrochemicals industry as a 'breeder' industry which, since it produced the raw materials for other industries, might be expected to lead in due course to the establishment of, for example, such industries as plastics.

Since the war BHC had made ethyl alcohol from ethylene on an increasing scale and the higher production which would result from the third ethylene plant would probably eliminate the use of molasses for the manufacture of industrial ethyl alcohol. The result should be a stabler and cheaper price for ethyl alcohol.

Major Expansion of British Celanese Oil-Cracking Plant

WORK has already begun and completion is expected in 9—12 months of the oil-cracking plant at the Spondon, Derby, factory of British Celanese which is to be expanded by approximately 40 per cent of present capacity. The plant produces ethylene and propylene and from them a wide range of petrochemicals. The expansion will incorporate a very extensive use of automatic control and recording apparatus.

Chemical products other than those based on petroleum are also manufactured on the same site. These, too, are being further developed in accordance with Courtaulds' widening interest in the whole chemical field.

The British Celanese plant, which began operating in 1942, was the first UK plant to produce alcohols and petrochemicals by the cracking process. Previously, UK production of ethanol had been based almost wholly on fermentation of imported molasses.

Research chemists of British Celanese began the work which led to this plant in 1931 after having first established methods of making acetone and acetic acid from alcohols.

The British Celanese cracking process is claimed to be unique and gives a remarkably high yield of useful products, particularly ethylene, propylene and butadiene. It differs in a number of important respects from the American steam-cracking method which is being operated in this country by later entrants to the field of petroleum chemicals. The original Celanese plant was designed entirely by the company's own technical staff without the aid of imported 'know-how'. The design of the new additions has again been entirely a Courtaulds/Celanese responsibility.

Between 1947 and now, output from the plant has trebled and the range of petrochemicals has considerably increased. These now include, in addition to acetone and acetic acid, vinyl acetate, hydrocarbon resin, butadiene, ethers and aromatic hydrocarbons, which are being increasingly used for a growing variety of purposes and products such as plastics, paints, fine chemicals, pharmaceuticals, anæsthetics, solvents, cosmetics, floor tiles and surface coatings, synthetic rubber, detergents, dyestuffs, adhesives, man-made fibres and textile finishes.

Other new projects recently authorised at Spondon include the manufacture of an improved quality of cellulose acetate flake for the plastics industry.

Extensions to methyl cellulose production capacity are also nearing completion. This product is finding an increasing use in wallpaper adhesives, food thickeners and paint.

Reinforced Plastics Group for BPF

FORMATION of a reinforced plastics group under the chairmanship of Mr. H. V. Blake, textile marketing manager of Fibreglass, is announced by British Plastics Federation. The aims of this group are to co-ordinate work on specifications and standards of workmanship of reinforced plastics and to study their long-term properties including weather resistance.

Manufacturers who manipulate reinforced plastics, and those who manufacture materials and equipment used in their production are eligible for membership.

Mr. Blake said that the formation of the new group would not only enable existing members of the federation who have reinforced plastics interests, to come together and decide their own destiny, but would, it was hoped, encourage the many important companies which were at present outside the federation, and in fact, outside the plastics industry, to join the group and add their knowledge to the common pool to the ultimate benefit of all.

From 22 to 24 October, the federation held a Reinforced Plastics Technical Conference at Brighton.

Monsanto Chemicals Expansion Plans

PLANS for large-scale expansion in the production of aspirin, phenacetin and maleic anhydride are announced today by Monsanto Chemicals Ltd. These expansions are in accordance with the company's intention, stated at the time of its last public share issue in October 1957, to develop its manufacturing activities in those fields in which it is already successfully established. They also take into account the probable establishment of a European FTA.

At the Ruabon factory the manufacturing process used in the expanded aspirin plant will further improve quality. The phenacetin plant will be replaced by a completely new unit. Complementary expansions will take place in the plants producing salicylic acid and paraphenetidine, the intermediates for aspirin and phenacetin respectively, and it is intended that quality will also be further improved.

The increased salicylic acid capacity, as well as meeting the needs of the aspirin plant, is expected to be sufficiently flexible to cater for the increasing market demands for this important intermediate and its derivatives.

Consolidation of their position as a major supplier of phthalic anhydride is also proposed by Monsanto. A further maleic anhydride plant is to be built at Newport following the commissioning there earlier this year of the company's original first intention maleic anhydride plant. It will more than treble the company's production of this basic chemical.

Ethylene Oxide Unit Not Involved in Explosion

THE EXPLOSION at the Partington Works of Petrochemicals Ltd., a Shell Chemical associate, at 9.15 a.m., on 18 October, in which two men have died and six are being detained in hospital, did not materially affect the new ethylene oxide plant.

Preliminary investigations indicated an extensive leak of ethylene in the area of the gas separation plant. A fracture was subsequently found in a fuel gas line leading to a large gasholder. As far as can be ascertained the gas was ignited by the motor of a small portable pump nearby. The new ethylene oxide plant was not operating at the time of the explosion, was not involved, and apart from superficial damage was not affected.

Nuclear Engineering Products by ICI

Closely associated with nuclear engineering since the beginning, the ICI Metals Division has now described its resources in this field for the first time in 'Products for Nuclear Engineering', which is obtainable from the Division at PO Box 216, Birmingham 6. The booklet deals with components in zirconium, niobium, vanadium and beryllium and other metals and includes notes on the properties of the newer metals.

CONFERENCE ON REINFORCED PLASTICS

Role of Peroxides in Curing Polyester Resins

SOME aspects of experiments on curing polyester resins which have been carried out, were dealt with by J. W. Cywinski (Novadel Ltd.) at the British Plastics Federation's Reinforced Plastics Technical Conference held at Brighton from 22 to 24 October. These included some problems connected with the methods of curing polyester resins and some observations on the influence of various organic peroxides used in varied quantities with and without accelerators on the physical properties of reinforced plastics. It was stressed that what was meant by reinforced plastics, were materials manufactured from glass fibres and polyester resin.

Peroxides had been found to be useful in the manufacture of those plastics which were formed by polymerisation of unsaturated monomers, that is, monomers containing at least one double bond between two carbon atoms. The catalytic capacity of peroxide compounds was owed to the fact that they could undergo cleavage forming free radicals. To judge whether a particular peroxide was to be preferred to another in this respect, its decomposition into radicals was studied as these initiated the polymerisation.

Decomposition

Of interest to the plastics industry were those having critical temperatures varying between 60° and 130°C. Decomposition, however, depended not only upon the temperature but also upon the medium in which the polymerisation was carried out. It had been found that decomposition rate was greater in monomers than in non-polymerisable solvents.

Polyester resins could be cured at various temperatures: at room temperature with or without stovings; at medium temperatures of about 35°—90°C; and at high temperatures above 90°C. In this country the most common method involved room temperature lamination and stoving at slightly elevated temperatures. For this type of fabrication ketone and hydroperoxides were most suitable, but in some cases benzoyl peroxide, due to its low price, was used. Nevertheless, preference was given to ketone peroxides used in conjunction with metal soaps, as this combination made polyester resin less sensitive to air inhibition. When a large proportion of filler was used tackiness seemed to be considerably reduced, Cywinski stated, and benzoyl peroxide could give satisfactory results provided a filler did not inhibit reaction.

Activities of six grades of methyl ethyl ketone peroxide (MEKP) were compared as gel times. In all experiments carried out at 20°C, 2 per cent of cobalt octoate containing 1 per cent of metal was used. The quantity of MEKP was adjusted so that 1.2 per cent of pure peroxide was present in the resin accelerator mix. It was found that for the same quantity of peroxide, practically the same peak point was reached with gel times varying between 11 and 60 minutes or for another resin between 42 and 68 minutes. Peak points with the same gel could be obtained varying from 40 to 140°C.

Contrary to some recently published statements, Cywinski said, gel time had *no* effect on the final properties of the polyester resin. Provided the quantity of peroxide was not too small or too large to produce, what was called by B. Parkyn 'permanent undercure', polyester resin would always reach the same degree of polymerisation when cured under the same conditions.

Elevated Temperatures

The same six commercially available MEKP catalysts have been tested for application at elevated temperatures—60, 70 and 80°C—and results showed the reverse order of activities. The phenomenon could be attributed to a varying degree of decomposition of commercially available MEKP's as influenced by metal soaps.

There was a certain difference between the commercially available materials as supplied by various manufacturers and this was particularly so in the case of cyclohexanone peroxide. In the production of this compound, several other compounds were formed and it had not proved possible to separate these until recently. While the commercially available product had a negligible difference in activity as far as the fabrication was concerned, there was a substantial difference in solubility of these catalysts in organic solvents. It was understood that in the near future cyclohexanone peroxide would be obtainable in two pure grades.

Cyclohexanone peroxide had been suggested as being suitable for all cases where development of heat would damage either the product or the mould. The exothermic reaction in polymerisation of polyester resin, due to cyclohexanone peroxide, was slower. Also the minimum quantity of peroxide essential to achieve a complete polymerisation was much lower for cyclohexanone peroxide than MEKP.

Metal soaps other than peroxides could be used with ketone peroxides. Gel time at room temperature remained in a range of several hours but at elevated temperatures was short.

Parkyn had claimed that the minimum quantity of cyclohexanone peroxide which could produce a complete cure was in the range of 0.4 per cent. Cywinski agreed with this claim with one proviso. For quantities between 0.4 per cent and 0.2 per cent, deterioration of properties due to various degrees of undercure was rather small. The more noticeable difference occurred when this quantity was reduced below 0.15 per cent. It was important to realise, however, that with quantities below 0.4 per cent of cyclohexanone peroxide, the process of curing and hardening took a considerable time. Even after a period of one year polyester resin polymerised with ½ per cent of peroxide showed continuation of hardening and with some reservations this could also be claimed for the specimen cured with ¼ per cent of catalyst.

While benzoyl peroxide for use by the plastics industry was manufactured as a paste of 50, 60, 65 and 70 per cent concentration in phthalate or phosphate plasticisers and also as 20 per cent powder in inert filler, solutions were available but these were not usually very stable. The only impurity which could be found was a trace of benzoic acid. Therefore all makes of benzoyl peroxide should have the same activity as catalysts. It had been noticed, however, that they varied up to 15 per cent in their activities. This was attributed to the size of particles, which varied between 2 and 6 microns: the smaller the size the more active was the product.

Room Temperature Curing

A comparison was made of the most common catalysts for room temperature curing. It was found that by increasing the quantity of acceleration the gel time of resin was reduced, while the same quantity of peroxide would give approximately the same peak point and therefore the same curing time. Butanox M-50 was found to be the most active catalyst for most of the resins.

Gel time and curing were affected and influenced by various additives such as pigments, filters and inhibitors. Gel time could be reduced by gelation agents. A small addition of tertiary amine was observed to speed up the gel time, while 1 per cent of 1 per cent solution of hydroquinone in DMP to polyester resin could retard gelation, e.g., from 34 minutes to 100 minutes. As an accelerator, when a diacyl peroxide was a catalyst, dimethyl *p*-toluidine proved to be much stronger.

Cure of polyester resin could also be speeded up by synergistic or complementary action of two peroxides. Addition of 1 per cent of lauroyl or benzoyl peroxide to polyester resin cured with cyclohexanone or methyl ethyl ketone peroxide was especially effective, reduc-

ing curing time without affecting gel time.

Various peroxides were found to behave differently at high temperature polymerisation. Most peroxides used at the temperature range 35° and 90°C required accelerators. Exceptions were rare (lauroyl peroxide could be used successfully at 60°C). Conclusions drawn from experiments carried out on 1/32 in. thick films were: (1) Peroxides with a tertiary carbon atom such as cumene hydroperoxide, 2,2-bis (tertiary butyl peroxy) butane and tertiary butyl hydroperoxide do not turn cobalt green, and resins remain pink. (2) All peroxides give a fair cure, as far as hardness is concerned, of the uncovered and covered films, but curing of the covered sheets when 2,2-bis (tertiary butyl peroxy) butane and tertiary butyl peroxide is slower at the beginning. (3) Solvent strengths of uncovered and covered sheets show great differences. The uncovered films have practically no solvent strength, the only exception being cumene hydroperoxide. (4) Most polyester resins used for room temperature laminations are free of tackiness when cure has been completed. A hard surface can be achieved even when the polyester resin is exposed to drying off the monomer. For manufacturing chemical plants, it was advisable either to prevent evaporation of styrene or to use a combination of MEKP and cumene hydroperoxide.

A number of experiments, it was reported, had been carried out to find out which organic peroxide was the most suitable for high temperature curing. Results were stated to be rather discouraging. Only one peroxide, namely dicumyl peroxide, could be considered as good enough. A second prerequisite for high temperature catalysts was strong activity. From this point of view benzoyl peroxide was found to be reasonably good at 100° to 160°C. At 130°C perbenzoate and peracetate gave good results. Ditertiary butyl peroxide, ditertiary butyl diperphthalate, dicumyl peroxide and dibenzyl peroxide acted fast enough above 160°C. At 130°C methyl isobutyl ketone peroxide seemed the most active.

Reference was made to several new high molecular weight peroxides, e.g., *p*-methane hydroperoxide, 2,5 dimethyl hexyl-2,5-dihydroperoxide, but no results were yet available.

In the third part of his paper, Cywinski considered the influence of organic peroxides on the polyester resins having regard to the following problems: electrical, optical and mechanical properties and machinability.

In concluding his paper, Cywinski pointed out that curing of polyester resins was a much more complicated matter than might occur to the fabricator, and that a lot more work had to be done before it was possible to control and carry out a polymerisation so that the best required properties of reinforced plastics were obtained.

Toxic Hazards in the Glass Reinforced Plastics Industry

METHODS of assessing toxicity of dusts and vapours in industry with particular reference to the glass reinforced plastics industry were reviewed by Dr. E. E. Lieber, Medical Officer to the Microcell Group of Companies at the Brighton conference.

One of the greatest difficulties confronting industry was dust, considered Dr. Lieber. H.M. Inspector of Factories Report for 1955 showed that 2,700 persons died of dust diseases of the lungs, including various forms of fibrosis, pneumoconiosis and byssinosis. These figures indicated that careful attention must be paid by chemical engineers to initial process design, plant design and layout in order to ensure safety both in operation and maintenance.

There was singularly little published information on the toxicity of the type of materials of interest to the plastics industry. The industrial chemist, nevertheless, who synthesised or introduced new material could usually go some way towards providing such information as: chemical structure; chemical and physical properties; probable industrial uses; and known hazards, such as inflammability, corrosive behaviour, etc. He could also offer personal observations on whether the material adversely affected his nose, eyes, skin and lungs, and whether there were indications for safety precautions such as gloves or goggles.

Outlining the basis for medical supervision of hazardous work, Dr. Lieber suggested proper selection of personnel including patch testing, regular clinical examination, periodic X-ray examination of the chest, frequent review of problems relating to dust and fumes in workrooms and training workers to responsible awareness of hazards inherent in processes which they operate.

The few particular materials used in the plastics industry were listed (see Tables 1 and 2). These caused allergic conditions by inhalation and might also cause skin manifestations. Since the gases shown in Table 2 were in a molecular state, they could find access to all parts of the respiratory tract. In considering their action on the respiratory system, their physical properties, in particular their solubility in water, was of greater importance than their chemical composition. With insoluble gases such as nickel carbonyl, the lungs could be damaged severely, while with the soluble gases the upper respiratory tract was the more severely upset.

There was little published evidence, stated Dr. Lieber, of the deleterious effects of the various polyester and epoxy resins. Size of the particles was very important. If they were 10μ or over, they could not reach the pulmonary alveoli, but the most dangerous range of particle size was between 0.2 and 5μ. Exposure to low concentrations for long periods was more dangerous than exposure to high concentrations for short periods.

In the reinforced plastics industry, the inhalation risk from glass fibres was practically non-existent. It was true that individual glass fibres were only from 20 down to 1μ or less in diameter. There was, however, such a high electrostatic charge on the particles that it was impossible to obtain concentrations in the air which could penetrate the alveoli. Unlike asbestos fibres, glass fibres were not retained in the bronchioles and therefore did not produce fibrosis.

TABLE I
Dusts

Type	Source	Hazard
Glass monofilament particles ...	Cutting and handling of glass mats, cloths and rovings	Inhalation Skin irritation Pharyngitis and Tracheitis
Glass and polyster or epoxy resin dust	Machining of cured mouldings	Skin irritation and dermatitis
Cotton, linen and phenolic or other resin dusts	Machining of cured mouldings	

TABLE II
Vapours

Type	Source	Hazard
Styrene	Resin compounding and utilisation	Pharyngitis
Methyl ethyl ketone peroxide ...	Accelerators	Pharyngitis
Phenol/formaldehyde	Phenolic and urea resins	Rhinitis, Pharyngitis and various other allergic manifestations
Trichlorethylene	Degreasing baths	Acute narcosis
Benzene, toluene, xylene ketones, alcohols and esters	Solvent vapours as in paint spraying	Various allergic manifestations, Aplastic anaemia Liver damage
Ammonia	Phenolic moulding	Unproductive cough Laryngeal spasms

Radiological Studies

Radiological and other investigations in the UK, the US and on the Continent, particularly in France and Germany, had failed to reveal any evidence of fibrosis or other lung damage arising out of contact with glass fibres. Statistics showed a comparatively low rate of absenteeism in the industry. Particles of glass might penetrate as far as the palate and might cause a slight dryness of the throat with allergic manifestations and an irritation. Normal dust extraction equipment was adequate to protect the workers engaged in handling glass fibre in any form, Dr. Lieber stated.

Medical examination should be twofold: first the initial examination of applicants for employment followed by regular six-monthly check-ups. The latter enabled any incidence of harmful effects to be detected at an early stage.

While there was evidence in certain industries that exposure to dust led to a greater incidence of sickness absence due to bronchitis, a long and careful survey of the position in the reinforced plastics industry had proved that there was no appreciable incidence of sickness absence due to dust or fumes arising from the processes involved.

Exploratory Study of Flow of Granules through Apertures

FOR the granular mass, where the grains were substantially in contact with each other, fundamental research had not yet provided a secure foundation for engineering design. In civil engineering the static granular mass had long been studied and recent advances in soil mechanics were notable, but in chemical engineering, where the dynamic granular mass was encountered, much less progress had been made.

Consideration of the little that was known brought into prominence a few simple facts, said R. L. Brown and J. C. Richards, British Coal Utilisation Research Association, Leatherhead, Surrey, in that paper presented at a meeting of the Institution of Chemical Engineers in London on 21 October. Whereas the free surface of a fluid in a gravitational field was horizontal, that of a granular mass could be inclined at slopes up to the angle of repose. A granular mass, in itself, could not support a tensile stress, and in some respects, it exhibited deformations akin to plastic deformation of solids. These facts had indicated the desirability of an experimental rather than theoretical approach to the study of the dynamic system.

The experiments reported by Brown and Richards give the rate of discharge of dry materials (sands and glass beads) through central orifices and slits from flat-bottomed vessels, thus bringing into prominence the effects of material characteristics, dimensions of the vessel, and aperture shape.

Measurements of Flow of Granular Materials

Measurements were made of the flow of dry granular materials from a series of cylindrical vessels ranging from 1.45 to 14.6 cm. diam. through circular orifices from 0.112 to 5.03 cm. diam. located centrally in horizontal bases. The materials covered a narrow range of size, the mean grain size ranging from 0.020 cm. to 0.11 cm. With sufficiently wide containers, the flow-rate was independent of the container dimensions.

Further measurements on flow through slits and elliptical orifices were found to be correlated satisfactorily in terms of a perimetral diameter $H = 4$ (area/perimeter). For flow from wide vessels all of the data could be represented by means of the dimensionless groups ψ and (K/H), where $\psi = \rho/QA(gP)^{-\frac{1}{2}}$. The form $\psi = \beta(H/K)\exp(-\gamma K/H)$ was stated to satisfactorily fill all the data for flow from wide vessels. The constants β,γ could be related to the angle of repose of the material, but further data were required. (K = perimetral diameter of orifice that just blocks (cm.); ϕ = mass flow-rate through aperture (g/s); g = acceleration due to gravity (cm.-s^2); A = area of aperture (cm.^{2}); β,γ = constants in representation of flow from wide vessels.)

For a given size of any of the materials the flow from narrow vessels was found to have the form $\psi = f(H/K,\ H/T)$, (where f = a constant). For spherical beads this function was independent of particle size, but this was not so for sharp sand. Consideration of experiments for flow from rough tubes suggested that the flow from narrow vessels was not influenced only by friction at the walls but also by interlocking of particles due to the proximity of the walls: it would appear that such interlocking might be determined, in part, by the angularity of the grains.

Rates of flow for various apertures were recorded and it was stated that: fine particles discharged more rapidly than coarse particles; spherical particles flowed more quickly than angular particles (thus the larger spheres there discharged at about the same rate as the smaller angular particles); and for apertures of the same area, an open-ended slit discharged at about the same rate as an elliptical aperture, but both were appreciably slower than the flow from a circular orifice.

The reduced velocity ψ is stated not to vary as much as Q and except for conditions near blocking, lies in the range 0.2-0.4. In the absence of detailed information on the flow properties of a given material the order of magnitude of the discharge rate could be calculated, within perhaps ± 50 per cent, by taking Ψ to be 0.3. This is limited, however, to materials that are dry and cover only a narrow range of sizes and to values of D/P [D = diameter of circular orifice (cm.) and P = mean particle size (cm.)] of the order of 20-30. More experimental data were needed, it was reported, before adequate practical rules could be devised; such data would appear likely to throw further light on the properties of the dynamic granular mass.

For a material with specific gravity 2.5, aperture dimensions in inches and Q in ton/hr., $Q = 2.72\ A(H)^{\frac{1}{2}}\ \psi$. For circular orifices $Q = 2.24\ D^{2.5}\ \psi$.

ICI and Winsford Salt Dispute

WINSFORD (Cheshire) Council's Planning Committee has received a report of its representatives' interview with Sir Alexander Fleck and other ICI officials concerning the contraction of the salt industry and its effect on the town. The Council contended that ICI had a moral responsibility to provide an alternative industry in place of the salt industry in order to maintain local prosperity. ICI's reply was that they could not accept any moral responsibility to introduce alternative industries when a local industry had to be contracted for economic reasons. They did, however, endeavour to find alternative employment in the factories for employees who became redundant. Winsford was not considered well suited for ICI's large-scale production of chemicals.

An extension of the rock-salt mine to the east side of the River Weaver was contemplated. The proving survey could be a costly measure which could not be undertaken at the present time, but a suitable area of land had to be reserved against this potential development. ICI had to preserve its own position in relation to the demands (for brine) of the Salt and Alkali Divisions, but applications for the sale of mineral rights were not ruled out. Each case would be considered on its merits. ICI would always exert themselves to minimise any adverse effects in any reasonable way that they could, as indeed, they had always done in the past. They would be prepared to be represented with other industrialists and interested parties on any joint development committee Winsford Council might wish to set up. Winsford Planning Committee had agreed that a development sub-committee should be formed to go into the whole matter of the town's industrial future and report its proposals back to the Council.

Foxboro Extend School for Customers

THE training school for customers started by Foxboro-Yoxall Ltd., at Wandsworth seven years ago has now been transferred to Redhill, Surrey, where larger premises have been specially designed for the study of industrial control instruments made by the firm.

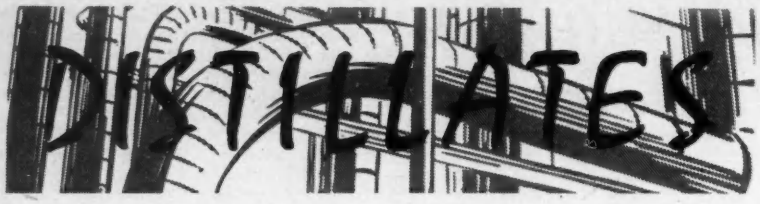
Each student has a bench supplied with compressed air and electricity 'on tap,' and a full range of instruments is provided for the student to dismantle, reassemble, calibrate and adjust.

Courses, at present limited to nine students at a time, last for three weeks and comprise:

Maintenance course A—designed to give instrument mechanics with limited experience in industrial instrumentation practical training in the use and maintenance of Foxboro equipment. The emphasis is practical.

Advanced instrument course B—designed for technical instrument engineers, and covering the theory of control instrumentation and its application to industrial premises.

In addition, special courses are arranged related to particular user industries, such as 'Instrumentation in the paper industry,' and 'Instrumentation for coal-washing plants.'



★ THE petrochemical complex at Grangemouth, like that in the vicinity of the Fawley refinery of Esso, has grown from nothing in a relatively few years. Even though vast expansion projects are in hand at both, there is still plenty of room for the further expansion which is inevitable.

At Grangemouth last week, when the first pile was driven for the third ethylene plant of British Hydrocarbon Chemicals (it will be the largest outside the US), Mr. J. M. Pattinson, chairman, said that BHC's olefine capacity would be doubled as a result. Olefines are the building blocks for the chemical industry and this project, he added, might therefore foreshadow a further investment programme. Mr. Pattinson pointed out that adequate land was available for new plants.

A number of chemicals suggest themselves for a future investment programme, whether at Grangemouth, Fawley, or one of the other petrochemical sites, such as Partington, Wilton or Billingham. It will not be long, for instance, before a UK company takes the lead by announcing that it will be the first in this country to make polypropylene, chloroprene, or acrylonitrile.

★ TO AUGMENT the salaries of the staff of the chemistry and chemical engineering departments at the Witwatersrand University, the Transvaal Chemical Manufacturers' Association has started a trust fund. Mr. S. Goodman, ex-chairman of the association, says that this has become necessary because salaries are so low that the best brains in science are being pirated away from teaching into industry.

The fund is the first of its type in South Africa, but it is hoped that it will trigger-off a similar scheme on a national scale. Once the problem has been solved at university level, it is probable that the salaries of science teachers in high schools will also be supplemented.

South African industrialists have been told at Ministerial level that legislation will be introduced to ensure that these donations to education will be tax-free.

★ BUILDING of the new factory of Resinas Sinteticas Lda. (Resintela), a company formed within the Powell Duffryn Group with its headquarters in Portugal, is now virtually completed. Resintela will produce synthetic resin.

In forming this company Powell Duffryn entered into partnership with Sociedade Central de Resinas (SOCER), largest producers of gum resin and turpentine in Portugal. The partnership also includes Sepulchre Limitada (Portuguese subsidiary of a Belgian company), Sociedade Comercial de Resinas and, as technical advisers, Reichhold Chemie in Germany.

Control of Resintela has been retained by the Powell Duffryn Group through the Portuguese subsidiary company of Cory Brothers, Companhia Geral de Combustiveis, Sarl, who have taken up the majority of the issued capital.

Erected under the guidance of Reichhold engineers, the new plant is of the latest design and will produce a number of Reichhold resins which Portugal has been importing. The factory is one of the first of its kind to produce synthetic resins in Portugal. One of the Reichhold products to be produced is urea formaldehyde glue

★ ACCORDING to information that reaches me from a member of the Institute of Trade Mark Agents, UK patents, design and trade mark registrations granted by the Patent Office do not hold good for the Channel Islands. Registration in London under the patent, design or trade mark laws, does not give protection in the Channel Isles which are self-governing as far as all internal matters are concerned.

Only by fresh registrations can such protection be given. As the law stands, patents not registered in Jersey or Guernsey carry no protection in the islands. The categories of patents and designs most likely to be of value for registration are those relating to products or articles which can be assembled or produced by relatively simple processes, including inventions relating to the production and use of fertilisers and insecticides.

No proceeding for infringement may be instituted in respect of acts committed before the date of registration of the UK patent.

★ THE ability of an electronic instrument, known as the 'black box', to enable archaeologists to detect buried objects has been challenged by an amateur diviner. Mr. P. A. Raine, chief chemist of Johnson and Phillips Ltd., electric cable manufacturers, who has been nominated the next vice-chairman of the London section, Royal Institute of Chemistry, wants to test the powers of the 'black box' against his own gift for dowsing.

The challenge has been accepted by Dr. Martin J. Aitken of the Research Laboratory for Archaeology and the History of Art at Oxford. Dr. Aitken recently returned from Enkomi, Cyprus, where successful trials with the instrument had been held on the site of an excavation.

The contest will probably take place early in the next digging season when the findings of the two methods can be proved by the spade. The 'black box' is a transistorised proton-resonance magnetometer which detects magnetism in buried objects or in disturbed ground.

Mr. Raine says that by using two simple brass rods he has detected objects as far down as 20 feet and on one occasion to have located pipes under 2½ ft. of reinforced concrete.

★ ONE EXAMPLE of scientific detection, quoted in the annual report of the scientific adviser to the London Council, was on the solid concrete floors of two houses which started to rise in the room centres. It was found that an underground spring containing sulphates had disrupted the hard core because of crystallisation. The department is following the stream to its source to prevent similar attacks on other houses.

LCC scientists tested 30,000 samples during 1957, ranging from building materials to sewage. Advice was given on such problems as the corrosion of cast-iron sewers over the railway at Plaistow, the strength of salt solutions to be taken by firemen exposed to great heat and the destruction of water-lily roots in ponds without injuring other plant or animal life.

★ MUCH RESEARCH has led the Boase Spinning Co. Ltd., flax canvas manufacturers, Dundee, to develop a new type of protection against sulphuric acid attack on cloth. This process is said to increase the life of canvas on oil-burning ships by three times when exposed to acid burns.

The research project arose when the company received complaints from shipowners and masters of the rapid destruction of canvas covers for hatches, lifeboats, machinery and other equipment. Sooty particles from the smoke stacks of oilburners are deposited on awnings and other canvas fittings and, after contact with water, develop dilute sulphurous and sulphuric acids which cause the burns.

The new proofing, in addition to a tough outer plastics skin, incorporates acid-neutralising chemicals within the flax fibres. Should any acid penetrate the plastics skin, it then encounters a second line of defence in the actual fibres of the cloth. Water-repellent and rot-resisting agents are also incorporated.

Alembic

Chemical Prices Lower Than a Year Ago

WHOLESALE price index of the Board of Trade for September gives a monthly index figure (1954 = 100) for the total sales of the chemical and allied industries of 104.1, 0.3 below the August figure and 2.4 points below the September 1957 figure. Index for home market sales only stood at 105.0 in September, the same as for August and 1.9 points below September last year. Figures for individual chemicals were:

	Sept. 1957	Aug. 1958	Sept. 1958
Chemicals Produced in the U.K.			
Dyes & dyestuffs ...	111.1	110.4	110.4
Disinfectants	112.4	112.9	112.9
Fertilisers †	114.7	113.3	113.8
Insecticides, weedkillers & fungicides	99.9	92.9	92.9
Synthetic resins & plastics materials	94.5	94.5	93.7
General chemicals ...	108.9	107.2	107.2*
Benzole, pure, BSS 136-1950	106.9	106.9	106.9
Caustic soda liquor, 100° TW	116.3	116.3	116.3
Soda ash, light (delivered)	115.3	115.3	115.3
Soda ash, light, f.o.r. works	117.7	117.7	117.7
Sulphuric acid, BOV ...	114.4	102.2	102.2
Sulphuric acid, ROV, 94/95%	111.2	99.4	99.4
Drugs & pharmaceuticals	99.1	97.5	97.5*
Soap	119.0	122.8‡	123.4
Synthetic detergents ...	102.6	103.1	103.1
Ethyl alcohol, industrial, BSS 507-1933	164.4	146.2	146.2
Commodities Wholly or Partly Imported			
Linseed oil, crude, spot, London, bulk, ex-tank ...	135.2	139.7	136.4*
Palm oil, c.i.f., in bulk ...	110.3	95.7	95.7
Whale oil, acid, soft, naked, ex-works...	159.6	154.5	154.5
Pyrites, c.i.f., UK ports ...	95.6	75.1	75.1
Sulphur, crude (for acid making), c.i.f.	97.0	80.0	80.0

† Excluding subsidies
‡ Revised figure
* Provisional figure

Czech Carbon Dioxide-Sodium Silicate Process for ICI

ICI STATE they have reached an agreement with the Czech patentees of the carbon dioxide-sodium silicate process for making foundry moulds. The application for restoration of the patent, which has lapsed, is now being considered by the Patent Office. If it is restored ICI will obtain an exclusive licence and will be prepared to offer sublicences to the foundry trade free of royalty. In addition ICI have secured access to all the technical information possessed by the Czech patentees.

Extensively used for production of steel castings in Czechoslovakia, the process has so far been employed in the US mainly for making castings of iron. It is described as simple and said to have the advantages of producing accurate moulds rapidly.

Capital Spending in UK Chemical Industry

Fixed capital expenditure in chemicals and allied trades in the second quarter of 1958 at £45.1 million was above the figures for the first quarter and for the same quarter in 1957. The following table shows capital spending in chemicals and the allied trades since 1954:

	1st qtr.	2nd qtr.	3rd qtr.	4th qtr.	Year
1954	—	—	—	—	97.2
1955	18.4	23.7	24.5	34.5	101.1
1956	29.4	32.8	34.4	44.0	140.6
1957	39.0	43.9	40.5	48.0	171.4
1958	36.9	45.1	—	—	—

'CARBON WILL RETAIN UNIQUE POSITION IN METALLURGY'

CARBON could be expected to retain its dominant position and Great Britain's large reserves of coking coals would provide industrial security for many years yet. This was the opinion of Sir Charles Goodene, director of the British Iron and Steel Research Association, who delivered the British Coal Utilisation Research Association's Seventh Coal Science Lecture at the Institution of Civil Engineers last week. The subject of his lecture was 'Carbon: the key to metallurgy.'

Sir Charles introduced his theme by referring to the remarkable role played by carbon in the history of extraction metallurgy since prehistoric times. With few exceptions, he said, the commercial production of most of the important chemical elements depended today on the use of carbon to reduce an oxide or some other compound containing oxygen in combination.

Besides its function as a 'universal key' carbon played two other important roles in extraction metallurgy. One was a ceramic, where the manufacture of uranium provided a good example; the other was the ability of carbon to impart strength to metals; steel was the exceptional example here. The explanation of carbon's remarkable properties as a 'key' element in releasing elements from their compounds with oxygen lay ultimately in the fact that when it was oxidised to form carbon monoxide the reaction was accompanied by an increase in entropy. On the other hand, the chemical 'affinity' of oxygen for the metals decreased with increasing temperature. Consequently, if the temperature were high enough oxygen could be removed from any ore to combine with carbon as carbon monoxide, leaving the metal.

Sir Charles considered the chemical engineering and kinetic aspects of reactions in which carbon took part and discussed the problems of bringing the molecules together to react and of separating the products of the reactions. Fortunately, carbon's remarkable reducing properties could be transferred to carbon monoxide, which could penetrate into the pores of ores.

Yet another advantage possessed by carbon was that in its various forms it provided a wide choice of reactivities.

Sir Charles did not think that carbon's unique position in extraction metallurgy was likely to be seriously challenged within the foreseeable future. The nearest rival was hydrogen, but there were many practical difficulties in preparing and keeping hydrogen dry enough for the purpose.

It was suggested by Sir Charles that the rise in the use of 'tonnage' oxygen, which was having profound effects on the refining of metals, could increase the usefulness of coal.

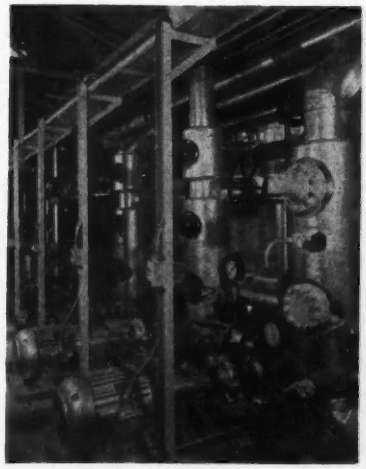
Standard Norma Pumps Help Cut Costs

MAIN suppliers of pumping equipment for the manufacturing processes and site services at the new plant for the International Synthetic Rubber Co. Ltd., Hythe, were Sigmund Pumps Ltd., Team Valley, Gateshead 11. The new plant was described in CHEMICAL AGE last week. Of nearly 80 Sigmund pumps supplied through Matthew Hall and Co. Ltd., who engineered the project, Sigmund Norma pumps were selected for most of the process duties.

The Norma is the standard, single-stage end-suction pump in the company's range. It was recently redesigned and arranged to give maximum interchangeability of spares, by standardisation of support frame and shaft assemblies to carry a wide range of impellers and casings.

In the Hythe plant this standardisation has proved successful as 80 per cent of the Norma pumps in service there have common parts with the exception of only five items. For all the Norma pumps supplied only three different shaft and bearing housing assemblies were used.

Standardisation to a high degree means exceptional flexibility for the operators in the maintenance and interchange of pumps to ensure servicing without hold-up in the supply of non-standard components. The pump spares stock is small and operations can be maintained at minimum cost in terms of spares and of shut-down time.



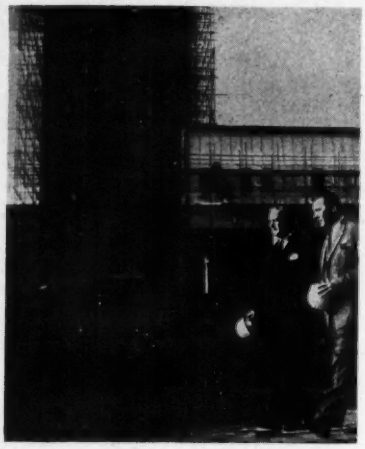
A battery of Sigmund Norma end-suction pumps on antioxidant transfer service at the ISR plant

CHEMSTRAND'S ACRILAN PLANT ON STREAM SOON

WORK is to start next month at the £3.5 million plant being built by Chemstrand Ltd. at Coleraine, Northern Ireland, for the production of Acrilan. The plant for preparation of the solvent used in the production of the acrylic fibre is already in operation. The main factory building and offices are being occupied and final stages of installing spinning machinery have been reached.

The plant which has been built in just under two years, is designed to produce 10 million lb. of fibre a year. Acrylonitrile is being brought to Coleraine by ship from Texas City, US, and is stored in two 700-ton storage tanks. Arrangements are in hand, however, for this main raw material to be supplied from the UK. Other chemicals required in Acrilan production are brought in by road from Belfast, Larne and Londonderry.

In addition to the processing facilities the works is equipped with its own machine shop where all reasonable repairs and light engineering fabrication can be done. Canteen and medical facilities are also available. When production starts the plant will work a non-stop shift system.



John Hay Whitney, US Ambassador, left, with Arvon L. Davies, managing director of Chemstrand Ltd., touring the Acrilan acrylic fibre plant at Coleraine, Northern Ireland, on 1 October, which is now nearing completion. In the background is the central tower of the main manufacturing building

New Reactor at Windscale

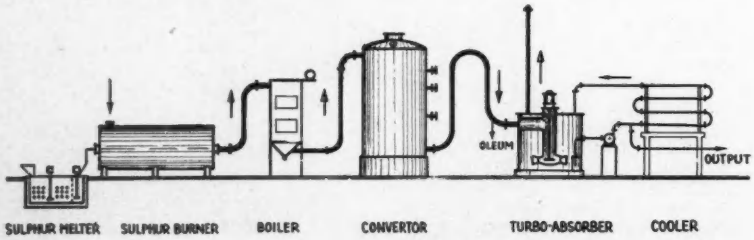
THE United Kingdom Atomic Energy Authority has been granted planning permission for the building at Windscale, Cumberland, of an advanced gas-cooled reactor, which it is hoped will become the prototype of the nuclear power stations to be ordered from about 1962 onwards. Clearing of the site has started and the reactor is due for completion in 1961.

Essential innovations are the use of beryllium canning and enriched fuel, the first of which offers higher working temperatures but which was questioned by US speakers at Geneva in September on the ground that beryllium is too difficult to fabricate. US designers, working on a similar type of reactor, have preferred to use stainless steel which would lead to a higher fuel cost than beryllium.

With beryllium canning it is hoped that gas outlet temperatures of 930—1,050°F will be achieved, compared with just over 700°F at Hinkley Point. Such high working temperatures raise doubts about the extent of the expected chemical reaction between the graphite of the reactor and the CO_2 gas used to extract heat from the reactor. As experiments at Harwell have been done up to only 930°F, more research will clearly be needed.

By using enriched fuel the heat output of a given weight of fuel would be increased to between three and three and a half times that in the Hinkley Point design. The fuel would be in the form of uranium oxide and it is envisaged that the plutonium produced would later be recycled through it. The gas pressure would be increased from 185 to 270 p.s.i.

New Moritz Sulphuric Acid Process



This flow sheet replaces that published in our issue of 30 August, which was wrongly submitted to us by Moritz Chemical Engineering Co. Ltd. to illustrate their new sulphuric process using wet catalysis

Bakelite Introduce New Clear Rigid PVC Sheet

A CLEAR, rigid sheet based on a polyvinyl chloride resin is being marketed by Bakelite Ltd., under the trade name Vybak DVR248. It possesses extremely good resistance to most chemicals, petrol, paraffin and oils, although some reagents may cause discoloration under certain conditions. The sheet also has good electrical properties and is odourless, tasteless, non-toxic and non-inflammable. Besides electrical applications, the sheet can also be used in motor-cycle sidecar glazing and windshields, transparent drafting and calculating instruments, dials and gauge covers. The sheet is not recommended for applications where resistance to temperatures in excess of 55°C is required.

Vybak DVR248 is available in a sheet size 50 in. × 25 in. with a polished/polished finish. Thickness range 0.010–0.030 in. The sheet may be formed into simple shapes by warming to 70°C as follows:—

Thickness	0.010 in.	0.015 in.	0.020 in.	0.030 in
Preheat	7 min.	7 min.	10 min.	10 min.

Revised BS for Steel Pressure Vessels

PLATES, sections, bars, rivet bars, and rivets used in the construction of land boilers, receivers and other pressure vessels, are specified in British Standard publication BS 1653, 1958.

A re-arrangement of contents makes for simpler and quicker interpretation of the requirements for the six grades of material.

Under the general section are included: manufacturing margins, marking, testing. Another section deals principally with chemical composition, heat treatment and mechanical properties.

An appendix gives the ratio of the 0.2 per cent proof stress at elevated temperatures to the minimum specified tensile strength at room temperature. Further appendices include the metric equivalents of the rolling margins for plates, and details of the tensile test pieces extracted from BS 18 (Tensile testing of metals).

Copies of BS 1633, 1958, may be obtained from the BSI, Sales Branch, 2 Park Street, London W1. Price 6s.

Gas Council's Methane Tanker Ready for Trials

THE '*Methane Pioneer*', the ship jointly owned by the Gas Council and Constock International Methane Ltd. and to be registered in the Port of London, is now fully converted to carry an experimental cargo of liquefied natural gas across the Atlantic. The ship is about to undergo her trials.

The trials will last some three months, after which the ship will sail for the UK to deliver the first experimental cargo to the North Thames Gas Board at their Canvey Island marine terminal. The liquid natural gas will then be converted to gas under pressure and delivered by direct transmission line to the board's Romford Works for reforming town's gas.

Overseas News

CLOSER CO-ORDINATION FOR USSR AND SOVIET BLOC CHEMICAL INDUSTRIES

THE East German Communist Party organ *Berliner Zeitung* announced last week that a programme was now being worked out by which the chemical industries of Eastern Germany, the USSR and satellite states would be brought into yet closer co-ordination and would provide more mutual help than previously. The chemical industry, it was stated, was now one of the two most important industries in Eastern Germany and, as such, its development had priority over that of any other. Production, particularly in the field of dyestuffs, would be phased in the Eastern Block as a whole to some extent and the exchange of processes and the loaning of technical aid and guidance more widespread.

Since 1952 there have been more than 400 exchanges of processes in the chemical industry between Eastern Germany and the USSR under a mutual aid scheme started in that year. At present the Soviet Union is sending technical aid to Eastern Germany, as well as equipment, for that country's growing petrochemical industry.

For some years chemists from Eastern Germany have been visiting Russia to study the production of superphosphate, sulphuric acid and synthetic rubber and to receive advice on protection techniques relating to acetyl cellulose, aluminium oxide, aluminium and the desalting of mineral oil, while the German industry has helped the Russian and other Cominform states' experts with its experience of synthetic fibres, calcium carbide and photographic chemistry.

Chloride of Lime Plant for South Africa

The K.O.P. factory at Chloorkop, Transvaal, S. Africa, have started operations at their £150,000 chloride of lime plant. The plant is stated to be the most modern plant of its type in the Southern Hemisphere, and will be able to meet all the Union's requirements (about 2,500 tons a year at present) and still have a surplus for export markets all over Africa.

First Commercial-scale Ethylene Oxide Plant on Stream

First commercial-scale plant to use the Shell Development Co.'s direct oxidation process for making ethylene oxide is on stream for Wyandotte Chemicals Corporation at Geismar, Los Angeles, US. This is the first of three ethylene oxide plants being designed, engineered and constructed by the Lummus Co., New York, US, each with an annual capacity equivalent to 60 million lb. of ethylene oxide. The other two plants currently under construction are for Calcasieu Chemical Corporation, at Lake Chares, Los Angeles, US, and for Petrochemicals Ltd. (Shell) at Partington, England. These are scheduled to go on stream later this year.

In the Shell process for making ethylene oxide, ethylene is reacted with oxygen over a silver catalyst in a fixed-bed reactor. Advantages claimed for the Shell process, which has been thoroughly tested in pilot plants, are high yields and virtual elimination of the waste disposal problems encountered in the chlorohydrin process. The plant also uses oxygen which requires less capital investment than the use of air (see CHEMICAL AGE, 18 May 1957, p. 836).

Wyandotte's process units consist of an ethylene oxide reaction section, an ethylene oxide purification section, an ethylene glycol section and an oxygen generation section.

Most of the ethylene oxide produced by Wyandotte will be converted by thermal hydration to ethylene glycol for industrial and antifreeze uses.

Russian Sulphuric Acid Production

According to figures released by the Soviet Central Statistics, output of sulphuric acid by the Soviet chemical industry in the first nine months of this year was 3.5 million tons. This is stated to represent an increase of 5 per cent over the same period of 1957.

Rexall Drug Co. Enter US Plastics Field

The Tupper Corporation and its subsidiary manufacturers and distributors of plastics products have been bought up by Rexall Drug Co., US. The deal has involved 175,000 shares of Rexall stock plus a substantial cash consideration. A $5 million five-year bank loan has been arranged.

Sulphur Production Possibilities In Western Canada

Managing director of International Sulphur Co. recently, Mr. W. H. Mickle, told the Calgary branch of the Chemical Institute of Canada that sulphur can be profitably produced from Western Canada's vast reserves of the element. Sulphur production, however, would not reach its peak until the export of natural gas was approved. The feasibility of piping hydrogen sulphide gas to Vancouver is now being studied, and the possibility of a sulphur gas pipeline to the head of the Great Lakes to make use of the new St. Lawrence seaway is under examination.

Alberta alone could produce 1,500,000 tons of sulphur annually on the basis of a 330-day year. Regarding the potential markets for Alberta sulphur, Mr. Mickle said an annual market for 500,000 tons of sulphur could be found in the northwest United States and in Western Canada.

Production of Chemical Fertilisers in Yugoslavia

During 1957 Yugoslavia imported 602,000 tons of chemical fertilisers compared with only 250,000 tons in 1955, and the 1958 figure is expected to be still higher.

To meet the increased demand, new plants will be built at Lukavac, Sisak and Kosovka Mitrovika. Each of the first two will have an annual production capacity of about 120,000 tons of calcium—ammonium nitrate and each will cost 10 million dinars (£10,000).

The third plant, which will cost 5 million dinars (£5,000), will have an annual production of about 250,000 tons of superphosphates. The sulphuric acid used will be a by-product of the Trepca mines.

BASF to Build Plant for Organic Fungicides

In the expectation that the demand for organic fungicides to combat plant diseases will increase considerably in the near fuutre, the Badische Anilin-und Sodafabrik AG, Leverkusen (BASF) have announced that they are to build a modern plant for the production of dithiocarbamate and thiuram. The new plant will come into operation during next year. Production will be great enough to cover German demand and also to export in worthwhile amounts.

Czechoslovakian Equipment for Russia's Chemical Industry

Tass, the Soviet news agency, reports that the Soviet Union chemical industry is to receive from Czechoslovakia equipment worth about 1,850 million roubles (£168 million at the official rate) under an agreement signed in Prague.

Spanish Gas Industry's By-product Production

Development of the gas industry in Spain during 1956 is indicated in a report recently issued by the Syndical Statistical Service of the National Syndicate for water, gas and electricity. Compared with 1955, the amount of coal processed (397,336 metric tons) in 1956 was 8,000 metric tons more. There was also a 5 per cent increase in the amount of coke gasified. Use of fuel oil increased from 379 metric tons in 1955 to 4,657 metric tons in 1956. The total gas produced showed an increase over the 1955 figure, reaching the maximum figure of production in Spain with a total of 334,533,147 cubic metres (316,464,000 cubic metres in 1955).

Coke production increased from 255,770 metric tons to 272,760 metric tons in 1956; tar from 15,933 metric

tons to 18,043; ammonium sulphate had decreased from 274 metric tons to 182 metric tons. Production of benzol is recorded for the first time in Spain and was about 65 metric tons, all of this quantity being obtained at the Barcelona works, a new gasifying installation for fuel oil which came into operation in 1956.

Ion-Exchange Resins as Catalysts In Acetone Cyanohydrin

According to US Industrial Chemicals Co., New York, US, acetone cyanhydrin can now be made experimentally by reacting acetone with hydrogen cyanide in the presence of anionic ion-exchange resins. These resins are stated to perform effectively as heterogeneous catalysts for the reaction. However, before the transition to a successful commercial operation can be accomplished, a way must be found to prolong the process life of the resins.

In anticipation of a rapid solution to this problem, a two-stage continuous flow reactor has already been developed. It employs a feed of acetone and hydrogen cyanide in the mole ratio of 5:1. This feed ratio is required to prevent swelling of the resin, moderate the evolution of heat, and displace the equilibrium in favour of acetone cyanhydrin. At 25°C, 99 per cent conversion is stated to be achieved.

Swiss CIBA To Finance Aniline Plant In Chile

The Swiss company Ciba AG, of Basle, is to form a Chilean subsidiary company. A plant will be erected near Santiago for the manufacture of aniline dyes and other chemical products.

Dutch Chemical Industry Expands

Rapid expansion in the Dutch Chemical industry is reported for 1957. During this year it was fourth among the sectors of Dutch industry in the volume of sales, coming after the metal, foodstuff and textile industries. It is expected to move up into third place during 1958.

Last year chemical industry sales totalled Fls.2,500 million (£238 million), compared with Fls.8,200 million for the foodstuff industry, and Fls.2,600 million for the textile industry.

New Synthetic Rubber Plant In Japan

Japan Synthetic Co. has started construction of a synthetic rubber plant with an initial annual capacity of 30,000 tons. Half of the company's capital (2,500 m. yen) has been provided by the Government (£2,500,000).

New Plant for Production of Sulphur

Much interest has been aroused in Sicily by the announcement that a new type of sulphur-processing plant will be installed experimentally at the EZI Experimental Centre at Terrapelata. It is claimed that this plant, dealing directly with the raw mineral brought from mines, can turn out sulphur at the cost of about 20,000 lire which is from 9 per cent to 13 per cent less than the world price at present in force. If the new plant gives satisfactory results in actual practice, it will be adopted throughout Sicily.

Philips' Lamps Atom Patent Claim Against USAEC

Philips' Incandescent Lamp Works' $20 million claim against the US Atomic Energy Commission as a compensation for the Dutch company's atomic energy plant is to be heard in Washington. The claim, which has been pending since 1954, refers to the Italian Fermi patent on radioactive isotopes taken over by Philips before the war, and which gave the company exclusive rights except in Italy, the US and Canada. The claim by Philips is based on the US laws of 1946 and 1954 on compensation for patent rights and remuneration for discoveries in the field of atomic energy. A similar action by the company against the UK Atomic Energy Authority was settled by a compromise agreement.

Steel Direct from Iron Ore

Peking Radio reported recently that a method of making steel directly from iron ore has been developed by the East China Chemical Engineering Institute.

The process, which involves the use of natural gas and makes it unnecessary to turn iron ore into pig iron in blast furnaces, can produce steel from ore in one and a half hours, it was claimed.

Rise in Russian Fertiliser Production This Year

Russia's Ministry of Trade announced in Moscow last week that as the result of a concentration of effort the production of artificial fertilisers in the USSR has so far this year risen by almost 6 per cent on last year's figures. At the end of September this year 9.2 million metric tons had been manufactured, as compared with 8.64 million metric tons in the first nine months of 1957.

Stauffer Chemical Form Drug Company With Merck AG

With E. Merck AG, Darmstadt, Germany, Stauffer Chemical is entering the pharmaceutical field. The new unit, to be known as Stauffer Pharmaceuticals Inc., is due to begin operations in early 1959 in the US and Canada. It joins Merck (Germany) fine chemical and drug research and new products with Stauffers' US and Canadian manufacturing sites. E. Merck AG is not connected with Merck and Co. in the US.

Plant Extension By British Nylon Spinners (Australia)

It is reported from Melbourne that British Nylon Spinners (Australia) Proprietary are making extensions costing £A500,000 to their Bayswater plant. Further extensions are planned within five years.

New Chemical Plant for Chile

Cristalerías de Chile, Chilean glass company, has now entered the chemical-producing world with the opening of a plant near Santiago, said to be the most modern and most highly mechanised of its type in the world. Investment in the plant, which is planned to produce considerable quantities of inorganic chemicals, is said to have been 500 million pesos.

Main chemicals produced at the Santiago plant are borax, boric acid, various types of soda, phosphoric acid and four types of soluble phosphates. Although the plant has only just come on stream the company reports that extensions are already in hand and will be finished some time next year.

Italian Rubber Consumption Up

From figures now available for the years 1954 to 1957 it is evident that the consumption of rubber in Italy increased by 14 per cent in four years and that this increase is accounted for essentially by an increase in consumption of synthetic rubber.

Price Changes

	1956	1957	% change
	(in lire per kg.)		
Syn. rubber, solid ...	397	396	dimin. 0.25%
Syn. rubber, latex ...	280	283	incr. 1%
Nat. rubber, solid ...	448	413	dimin. 7.8%
Nat. rubber, latex ...	362	332	dimin. 8%

The rise would have been even more pronounced, it is considered, were it not for the price trends that had prevailed.

There have been substantial diminutions in the price of natural rubber while synthetic solid rubber dropped only by 0.25 per cent, and the price of synthetic latex even increased.

In 1957, Italy imported the following quantities of rubber:

Synthetic solid ...	17,907 tons
Synthetic latex ...	2,088 tons
Natural solid ...	54,130 tons
Natural latex ...	9,665 tons

The value of these imports totalled 33,239 million lire.

Consumption of Rubber in Italy

	Total consumption of Rubber	Natural Rubber	% of the Total	Synthetic Rubber	% of the Total
1954	64,000 tons	54,000 tons	84.4%	10,000 tons	16.6%
1955	70,000 tons	57,000 tons	81.4%	13,000 tons	18.6%
1956	70,000 tons	55,000 tons	78.6%	15,000 tons	21.4%
1957	73,000 tons	53,000 tons	72.6%	20,000 tons	27.4%

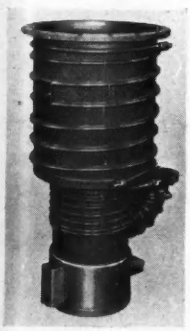
EQUIPMENT REVIEW

Chemical Plant: Laboratory Apparatus: Safety and Anti-corrosion Products

DEPTH GAUGE FOR BULK STORAGE TANKS RECENTLY redesigned to provide a clearer and more easily read dial, the latest 'Clyde' depth gauge is a robust and reliable instrument which can be fitted to all kinds of bulk storage tanks. Manufactured by **Buchanan Brothers Ltd.,** Commerce Street, Glasgow, the depth gauge is available with 6 in. or 10 in. diameter dials. The maximum tank depth for the 6 in. dial size is 6 ft. and for the 10 in. dial size, 10 ft.

Each gauge is calibrated separately to read correctly at any depth and in order to facilitate this the dimensions of the tank should be supplied when ordering. The dial of the gauge has large black figures on a white background and it can be read from considerable distances. A red line indicates the 'float grounded' position. The float is 4 in. long.

HIGH-SPEED DIFFUSION PUMP THE METROVAC type 9/14 is a new diffusion pump recently introduced by **Metropolitan-Vickers Electrical Co. Ltd.,** Trafford Park, Manchester 17. Designed primarily to give its highest pumping speeds at the lower pressures, it is suitable for the large vacuum systems used in nuclear physics research, and if formed, in fact, the basis of the high-vacuum system supplied by Metropolitan-Vickers for the evacuation of



Metrovac diffusion pump

the 'Zeta' torus. Both oil and mercury versions of the pump are available.

The characteristics are those of a 14 in. diameter pump at pressures below 5×10^{-4} mm. Hg, and of a 9 in. diameter pump at higher pressures (of the order of 10^{-3} mm. Hg), but with a power consumption of only 2.5kW for the oil pump and 3kW for the mercury pump.

The peak, unbaffled air speed of the oil pump is 2,850 litres per second, which is claimed to be a far higher speed than that attained by conventional rivals with the same power consumption.

NEW FLEXIBLE PIPE COUPLING A NEW flexible pipe coupling suitable for fuel, hydraulic, pneumatic and lubricative systems has been introduced by **Aero Controls Ltd.,** Industrial Estate, Weedon Road, Northampton. ACFlex pipe couplings, which convert rigid tubes into flexible assemblies, will accommodate tube misalignment up to 1/16 in., tube separation up to ¼ in. and allow ±4° tube flexure.

They eliminate the necessity for metal bellows in pipe runs and, as they can be installed after tubes are in place, the structural apertures need be no larger than the standard bead on the tube. An axial movement of 0.35 in. is permissible; they can function as slip joints.

Little more than hand tightening is required to achieve pressure tightness over a large temperature range. Working pressure is −11 p.s.i. to +125 p.s.i.; proof pressure is +250 p.s.i.; and bursting pressure is +375 p.s.i.

Temperature range is from −50°C to +70°C.

Couplings are made in stainless steel and are suitable for corrosive fluids such as nitric acid. Full details of proposed application should be referred to the company's sales department to enable the most suitable choice of O-ring material to be made.

BECKMAN IR-5 MONO-CHROMATOR THE Beckman IR-5 red spectrophotometer is the conventional Littrow type, utilising a sodium chloride prism which disperses the radiation twice. Radiation source is a coiled nichrome wire with virtually unlimited life. This instrument was recently demonstrated by **Baird and Tatlock (London) Ltd.,** Freshwater Road, Chadwell Heath, Essex, from whom it is available.

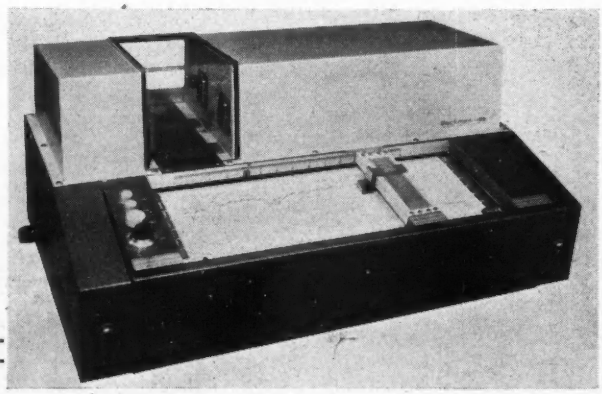
It automatically records linearly in per cent transmittance and wavelength and scans the entire 2 to 16 micron range in 16 minutes. A horizontal recorder permits use of preprinted chart paper on which the recorded spectrum is visible at all times. Only five controls are needed to operate the IR-5; on-off switch, scan and stop buttons, 100 per cent adjust; and a gain control. Scanning speed is fixed and other operating parameters are matched for optimum performance at that scanning speed. An over-ride permits the slits to be widened for differential analyses at fixed wavelengths.

The IR-5 is hermetically sealed to protect optics. A thermostatically-controlled heater system maintains internal temperature at a constant level. The instrument can readily be adapted for purging with dry nitrogen, etc. Resolution is demonstrated by the polystyrene spectrum obtained at the fixed scanning speed of 16 minutes.

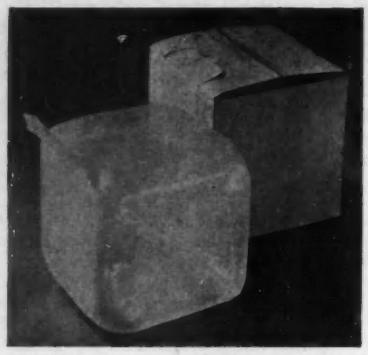
A new leaflet gives notes on low-cost infra-red analysis, including identification of unknowns and analysis of highly complex materials.

COLLAPSIBLE POLYTHENE 'BOTTLE' A NEW liquid container consisting of a lightweight polythene 'bottle' strengthened by an outer corrugated cardboard box, suitable for many types of chemical products, is to be marketed early in 1959 by **Iridon Ltd.,** one of the Commercial Plastics group of companies. Developed in the US it will be known by the registered name of 'Cubitainer'. It will be available in five-gallon, one-gallon and quart sizes. Commercial Plastics hold an exclusive licence to produce and sell these containers in the UK.

As a non-returnable pack, 'Cubitainer' will, it is said, save transport costs, stock-room time and much clerical work; storage room is considerably reduced. The containers are supplied with the polythene inserts collapsed and the cardboard boxes folded flat and approximate storage space figures suggest that 50,000 one-gallon 'Cubitainers' collapsed



Beckman IR-5 infra-red spectrophotometer



Polythene inner and cardboard outer of the Cubitainer

occupy 6,250 cu. ft., as against 10,200 cu. ft. for an equal number of rectangular cans, while 50,000 five-gallon 'Cubitainers' collapsed take up 26,250 cu. ft. compared with 84,000 cu. ft. for 50,000 five-gallon glass containers.

The collapsed polythene 'inner' is inflated by air pressure and inserted in the cardboard 'outer.' The polythene 'bottle' is then filled via the open spout which may then be heat-sealed, folded into the box and the box secured. To empty, the pliable spout is pulled out through an aperture in the cardboard casing and cut open. The five-gallon unit is provided with a hand grip on each side of the box for ease of pouring. The spout can be stoppered if the container is not emptied at once.

'Cubitainer' is said to be unaffected by most chemicals, but a comprehensive list of liquids for which they are not recommended is supplied by the manufacturers.

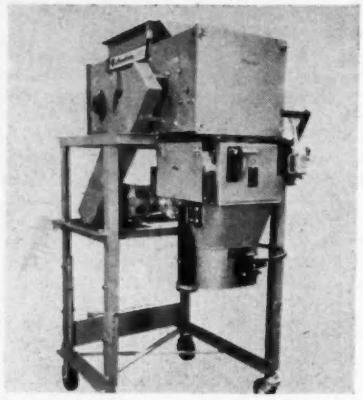
MULTI-COLOUR PAPERLESS LABELLER A NEW machine, said to be the only one of its kind in the world that will print up to a four-colour label direct on to the container at one operation, is the Dawson patent fully automatic rotary muli-colour paperless labeller. It is made by **Dawson Bros. Ltd.**, Gomersal, nr. Leeds.

Bottles, jars, cans and similar cylindrical containers, in all sizes up to a gallon, whether made from glass, metal, fibre or plastics, can be given an attractive body label. Changing from printing one size of container to another is quite a speedy operation. The label cannot be torn off like a paper label, nor can it fall off at low cold-room temperatures. At the same time it will withstand heat over pasteurisation temperature.

Containers are fed on to an intermittent conveyor which carries them in turn to the proper printing position. When in this position they are held in chucks and automatically rotated to receive the design of the label from rubber printing plates mounted on a precision built revolving cylinder. The intermittent silent Geneva unit brings the rotation of the containers and the cylinder into correct time relation and a multiple set of cams ensures perfect registration for the different colours. Geneva unit allows any pre-determined time limit for containers to pass through the machine.

NEW US GROSS BAGGING SCALE A NEW inexpensive gross bagging scale, with feeder, featuring an eye-level visual balance indicator which enables on-the-spot elimination of weighing errors, has been introduced by the **Richardson Scale Co.**, Van Houten Avenue, Clifton, NJ, US. This indicator operates on the torsion principle so that indication is rapid, accurate and stable.

The new unit, the GA-17 gross bagging scale, was developed to meet the needs of small plants for an inexpensive, one-man bagging unit. With this scale,



GA-17 gross bagging scale with feeder

bagging of pellets, chemicals, powders, flakes and other non-free-flowing materials is done at both low initial and low operating costs. It is available in stainless steel for the handling of fertilisers.

Designed for use with open mouth textile and multi-wall paper bags, the GA-17 provides accurate filling of 10 to 140-lb. bags. The weigh beam indicator-pointer is marked off in easy-to-read numerals and informs the operator at a glance the accurate balance of the weigh beam. The scale requires only minimum head-room.

A compensation arrangement automatically cuts off the scale at accurate weight. A slide attachment permits serving many spouts and a large manhole allows observation and access.

MODEL 2700 INDICATING FLOWRATOR INTRODUCTION of the Fischer and Porter Model 2700 indicating flowrator, by **Fischer and Porter Ltd.**, Salterbeck Trading Estate, Workington, Cumberland, which is of revolutionary design, is stated to eliminate the use of stuffing boxes and packing glands by the use of rubber 'O' rings which seal the tube ends to the metal end fittings incorporated in the metal body. This body is a robust assembly of mild steel pressings obviating the need for bolts and screws. Benefits which are derived from the method of construction are claimed to be: Complete isolation from pipeline stresses of the metering tube; metering tubes can be snapped in without the use of tools and without disconnecting or dismantling the meter; range changing and cleaning are reduced to simple quick routines which may be accomplished without removing the instrument from the line; the meter withstands high pressures.

Two frame sizes will be available allowing 10:1 ranges to be provided from a maxima of 3-30 cc./min. air and 0.35-3.5 cc./min. water to maxima 4-40 s.c.f.m. air and 50-500 l.g.p.h. A third size of meter frame will shortly become available to accommodate flows up to 17-170 s.c.f.m. air and 200-2,000 l.g.p.h. water.

NEW PLYWOOD PACK FOR ACID CARBOYS SAFETY and economy are combined in a new development in the packing of carboys of acid and dangerous chemicals, which has been pioneered by the Manchester factory of **Venesta Ltd.**, Vintry House, Queen Street Place, London EC4. The principle of the new pack is a plywood barrel with an inner plywood sleeve which is insulated against the exterior wall by bands of rubber, with rubber cushions at the top and bottom.

The design has been approved by both British Railways and the Ministry of Transport and Civil Aviation

The lightweight container is said to enable considerable cost-saving in carriage and freight charges. It is a returnable container.

The lower portion is of 4 mm. plywood with two body bands, the base being secured by double closing hoops. A ½ in. thick rubber disc, 10 in. in diameter with a 6 in. centre hole is fixed to

Plywood pack for carboys

the base with rubber solution. The inner sleves is also of 4 mm. plywood, and is fitted into the outer container with two 1 in. by ½ in. rubber bands acting as shock absorbers against the exterior wall. Two ⅛ in. diameter steel rings are secured to the top outside face of the

inner sleeve which extends to 2½ in. below the top exterior. These rings are used to secure the carboy in position with wire or cord.

The top portion of the barrel is similar in construction to the bottom in that it is made of 4 mm. plywood with two body bands. The lid is secured with double closing hoops, and is separated from an inner disc by means of an embushment 3¼ in. wide. This inner disc has a 4 in. diameter centre hole to take the neck of the carboy, and has a 6 in. diameter rubber ring affixed which is pierced with a 3½ in. centre hole. The 3¼ in. diameter rubber pad taken from the centre hole is fixed to the inside of the lid. In this way the cap and neck of the carboy are carefully protected.

An embushment of 4 mm. plywood 3¼ in. wide secures the inner disc, and projects 2 in. below the top to engage the lower portion of the barrel, the whole being secured by three toggle fasteners.

The Venesta carboy barrel at present being supplied is 24¼ in. high, the inside depth between cushions being 21¼ in. and the inside diameter of the sleeve 12 in. Other sizes can, however, be manufactured.

QUASI-ARC'S MIRROSPEED ELECTRODES

MIRROSPEED electrodes, designed for fast and economic welding of mild steel, are now being manufactured by **Quasi-Arc Ltd.**, Bilston, Staffs. They are said to be easy to use and a 'touch' technique is preferred so that even a moderately skilled welder can achieve sound results. The electrodes are suitable for production work where high output and good weld profile are of major importance since their characteristics include smooth running, quiet arc and fluid yet easily-controlled slag. Easy slag detachability enables de-slagging to be kept to a minimum.

The electrodes are satisfactory for welding in all positions and are particularly suitable for flat and horizontal-vertical fillet welding and flat butt welding. In fillet welding the electrode can be 'drawn out' to give very long run lengths.

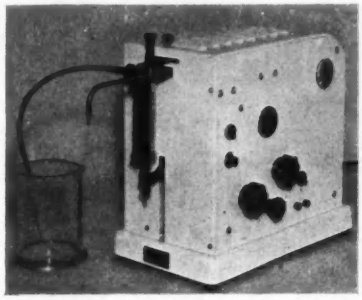
Mirrospeed are manufactured in sizes ranging from 12 s.w.g. to 4 s.w.g. inclusive. They are fully extruded and coded under BS 1719/1951 classification as E217. They can be used on AC or DC, in the case of DC the electrode can be connected to either pole.

STRUERS AUTOMATIC DISPENSER

NEWLY introduced by **Camlab (Glass) Ltd.**, 50 Burleigh Street, Cambridge, is the 'Struers' automatic dispenser. This versatile and accurate piece of equipment is intended for use in pharmaceutical and biological dispensing. It produces identically measured volumes of the liquid in use.

The measuring of liquid volume within the dispensing chamber is effected by a connecting rod with adjustable stroke linked to a variable speed motor. In place of the usual valve controlling the liquid volume, is a flat moving disc driven by the main crankshaft. This ensures a quick and precise open/shut thrust and, due to exact 'reverse flow' mechanism following immediately on the stroke, the individual liquid fractions are delivered without the formation of drops.

The quantity of liquid to be dispensed is preset by simple manual adjustment of the control knob. Once a setting has been finalised, it can be reproduced at will by referring to the reading obtained on the vernier-type precision scale. This instrument covers the range 0.1 to 20.0 ml.



Struers automatic dispenser by Camlab (Glass)

Also new from Camlab is the Vibromix under-water stirrer. Fitted with a DC motor requiring an 8 volt supply, this instrument mixes, agitates, pumps, circulates, emulsifies, stirs, sprinkles and aerates. A series of either stainless steel or Pyrex glass disc stirrers is available.

NEW USES DEVELOPED FOR KNITMESH

SINCE its introduction to the UK market in the autumn, many new uses have been developed for KnitMesh. This material, made by **KnitMesh Ltd.**, 36 Victoria Street, London W1, was described in CHEMICAL AGE, 30 August, p. 358, as a new development for column packing.

New leaflets now issued by the company describe other applications. KnitMesh demisters (entrainment separators, mist eliminators) are made of knitted wire mesh. The mesh materials are designed to enable the construction of entrainment separators that will give highly efficient and economical removal of liquid and solid particles entrained in vapours or gases. Using the full range of meshes, demisters can be designed to give free volumes of between 88 and 89 per cent and surface areas of about 40 to 1,200 sq. ft./cu. ft. Applications include absorbers, compressors, concentrators, evaporators, gas separators, knock-out drums, lube towers, scrubbers and vacuum towers.

KnitMesh in stainless steel is also being used in jet exhaust cone blankets; in missile electronic devices; in surgical instruments; and in high temperature seals.

NEW PIPE FITTINGS

A new range of pipe fittings moulded in Geon RA.170 high impact p.v.c. has just been introduced by Extrudex Ltd., Bracknell, Berks. Elbow bends, T-pieces, couplings, adapters and flanges are included so permitting the construction of complicated systems of pipelines entirely in Hipact p.v.c. These systems are said effectively to resist corrosive influences and mechanical damage

ROBUST ELECTRONIC RELAY

AN ELECTRONIC relay, robust enough for industrial use yet sufficiently sensitive for laboratory applications, is introduced by **Londex Ltd.**, Anerley Works, Anerley Road, London SE20. With this new design, ordinary leads up to 100 ft. in length can be used for the trigger circuit, co-axial cable not being essential.

Sensitivity is such that the relay will operate through an external resistance of up to 2 megohms, when the current in the circuit is then only 0.03mA.

Chemicals Exempted from KID until 31 December

Under Section 10(5) of the Finance Act, 1926, the Treasury have made an Order exempting the following chemicals from Key Industry Duty until 31 December 1958:—

Synthetic organic chemicals, analytical reagents, other fine chemicals and chemicals manufactured by fermentation processes, the following: α-Anhydroglucochloral, benzocaine, butacaine sulphate, 3-chloroaniline, *N*-*p*-chlorobenzenesulphonyl-*N'*-*n*-propylurea 2:6-diamino-3-phenylazopyridinium chloride, *NN*-diethylaminoethylcellulose, ethylene brassylate, ethyl 13:14-di-iodobehenate, 2-ethylhexyl acrylate, ethyl α-hydroxy-α-methyl-*n*-butyrate ethyl linoleate, *N*-ethyl-*N'*-(5-nitro-2-thiazole) urea, *N*-ethyl-3-piperidyl benzilate methobromide, *N*-ethyl-3-piperidyl diphenylacetate hydrochloride, 3:2-mercurioxy-4-nitrotoluene, potassium persulphate, sodium xanthate.

The Order, which comes into operation on 18 October 1958, is published as Statutory Instruments 1958 No. 1691. Copies of the Order may be obtained (price 3d net, by post 5d) from HM Stationery Office, Kingsway, London WC2.

FARBWERKE HOECHST TO SPEND SOME £16¾ MILLION ON EXPANSION PROGRAMME

IN all fields except that of dyestuffs, progress by Farbwerke Hoechst during 1958 has been more than satisfactory, with a rate of increase in turnover considerably higher than the average for the West German chemical industry as a whole and very much higher than that for the West German industry as a whole. To increase this expansion yet more an investment programme entailing DM200million (about £16¾ million) had now been decided on for 1959.

These were the main points in a speech made to the press by Prof. Dr. Karl Winnacker, a director of Hoechst, in Frankfurt-on-Main. In this progress report for 1958, Prof. Dr. Winnacker first outlined the main difficulties facing the company at present—increased foreign competition and a minor slump in the textile industry—and then went on to show what the company had achieved despite these.

Petrochemicals: Good progress in the petrochemical field was reported. The Frankfurt plant supplies all ethylene and propylene for the production of Hostalen plastics of the company and the company's ethylene needs for the production of glycol could now be met from its own ethylene production. A new cracking plant had been brought on stream at the Gendorf plant in the summer. Work on a new high-temperature cracking plant which would guarantee a supply from Hoechst's own resources of the ethylene and acetylene needed by the Frankfurt plant over a long period had come into operation during recent months. This plant would be the first in Germany to produce acetylene from oil by this process.

Good Demand for Man-made Fibres

Fibres and sheet products (*i.e. Trevira, etc.*): Particularly good demand was reported for these products this year, with Trevira in particular well sought after, demand far exceeding supply. Production for this synthetic fibre would be expanded and had in fact already been increased to some extent. In spite of price competition, cellulose film sales rose greatly and p.v.c. sheets could not be supplied in sufficient quantities to meet demand; more of this commodity would be produced monthly when expansion plans were completed this winter.

Inorganics: Good progress in production. Chlorine alkali electrolysis plants were in full production, and would be extended during next year because of the present shortage of chlorine. Phosphorus production rose considerably.

Nitrogens and plant-protecting preparations: There had been an all-round considerable increase in sales, particularly in home demand for artificial fertilisers. Extension of capacity in this field was also on hand.

Plastics and solvents: This was a field which might be developed to the full. An above-average increase in polyvinylacetate plastic preparations (e.g. 'Mowilith') had occurred despite strong competition. Sales of Hostalen had also been successful; production capacity for this plastics material was being used to the full. Further possibilities in this field were always presenting themselves, particularly in the manufacture of piping, despite strong competition. Introductory work for the production of polypropylene (Hostalen PPH) was reported to be going ahead most satisfactorily.

A general over-production of p.v.c. meant unrealistic prices and no expansion of Hoechst's capacity for this commodity would be made at present. A higher production of carbide by Hoechst by the installation of a new carbide furnace at the Knapsack plant meant a great step in the rationalisation of the plant and an improvement in the supply of raw material generally. When coal price increases came to a stop, Hoechst would expand carbide production yet further.

Dyestuffs: Production was not as high as last year due to textile recessions and competition from all sides. Keen research has been carried out, however, particularly into dyes for artificial fibres.

Pharmaceuticals: Very good progress was reported, particularly in the field of polio vaccines. Further capacity expansions were planned.

Hoechst Chemical Corporation was being extended in US for the manufacture of pigments and new textile dyes. The new plant in Suzano, Brazil, had been opened. In Austria and France plants for Mowilith production had come on stream and a small pharmaceutical plant had opened in India.

The extension to the research laboratories was completed during 1958, and at Griesheim the radiochemical laboratory had come into operation.

German BP's N-Butane Plant at Hamburg

ONE of Europe's most modern petrochemical plants is the n-butane installation opened by BP Benzin und Petroleum AG at their Hamburg oil refinery this summer for test runs and now in normal production. The plant produces 230,000 metric tons of light hydrocarbon products annually when on full stream; some two-thirds of these are straight-run light gasolene, about 23,000 tons normal butane and the rest, apart from very small quantities of 'coincidental by-products', divided between propane and isobutane.

Streams from all over the refinery are piped to the feed tank of the n-butane plant and combined to produce the necessary quality of primary feed oil—in this case a feed which contains butane and not too great a quantity of isobutane, C_1 or C_2. Preliminary distillation gives a light petroleum spirit as bottom product and a petroleum gas with a high butane content as top product. The butane mixture is then passed on to two further distillation towers for separation from isobutane and other unwanted hydrocarbons. A fourth tower in the plant is a recovery unit for undesirable hydrocarbons from the straight-run process gasolene.

The two distillation towers for purification of the butane are, in fact, one tower in two halves. A particularly high purity standard is required for the n-butane—over 99 per cent—all of which is supplied, by rail tanker, to Bunawerke Hüls GmbH, the recently-opened synthetic 'cold' rubber manufacturing concern of Marl, Westphalia, for the production of butadiene. An extremely high tower would have to be used to obtain n-butane of such purity as this—one of a height that would be impractical. The Lurgi chemical construction concern which erected the plant decided, therefore, to build it in two parts of equal height.

The plant is not yet working at full capacity, and its throughput will rise according to the needs of the Bunawerke, its sole customer for n-butane. With any increase in butane production, the output of the plant's other products will naturally also rise correspondingly. At present there is a healthy demand for the two other petrochemicals manufactured at Hamburg—isobutane and propane—and these find a steady market both at home and as exports, particularly to the Scandinavian countries. The light petroleum spirit produced as a bottom product is disposed of on the oil market along with other of the refinery's oils; however, although in tonnage it is the main product of the n-butane plant, the butane is the basis of the whole installation and demand for it dictates total output of the plant.

Corrosion Research

The Arthur D. Little Research Institute at Inveresk Gate, Musselburgh, Midlothian, is engaged on a programme of research into the fundamentals of corrosion and is building up a team of fully qualified scientists with knowledge of electro, surface, or theoretical organic chemistry.

PEOPLE in the news

● MR. J. WILSON, C.B.E., M.C., M.Sc., F.I.R.I., F.R.I.C., president of the British Association of Chemists, is to be presented with the Hinchley Medal of the association for 1957 at a meeting to be held at the Royal Society of Medicine, 1 Wimpole Street, London W1, on 29 October at 7 p.m. After the presentation Mr. Wilson will deliver the Hinchley Memorial Address, which he has entitled 'Grant-aided research associations'. Visitors will be welcome at this meeting.

● MR. J. T. PROCTER (Anderton-Richardson Fertilisers Ltd., York), has been elected president of the Fertiliser Manufacturers' Association for 1958-59. Vice-president is MR. H. G. ROPE (Fisons Ltd.).

● MR. F. M. STEVENS (Sheppey Glue and Chemical Works Ltd.) has been elected chairman of the Superphosphate Manufacturers' Association for 1958-59. Vice-chairman is MR. J. CROZIER (Scottish Agricultural Industries Ltd.).

● DR. MICHAEL DAVIS, B.Sc., Ph.D., F.R.I.C., a research chemist with May and Baker Ltd., Dagenham, Essex, is the first holder of the Stickings Memorial Fellowship. This was recently founded by the company to allow selected employees to spend a period of a year in France in scientific or technological

Dr. M. Davis, first holder of Stickings Memorial Fellowship

studies. It is open to any employee between the ages of 21 and 35 in the M. & B. group provided that he or she possesses sufficient knowledge of French. Dr. Davies, who joined May and Baker in October 1949, goes to Paris this month to begin his year of post-graduate research. For him there will be no language barrier as he has studied French for many years and was chairman last year of the language section of the M. & B. club.

● SIR ALEXANDER FLECK, chairman, of ICI, has been elected an hon. fellow of the Royal Faculty of Physicians and Surgeons of Glasgow.

● DR. J. V. DUNWORTH, formerly head of reactor division, Atomic Energy Research Establishment, Harwell, has been appointed assistant director (reactor research policy). In this post he will be special adviser to the director of Harwell. He is succeeded as head of reactor division by MR. T. M. FRY, who has been a deputy head of the division. DR. PETER THONEMANN, head of the controlled thermonuclear reaction (fusion) division at Harwell, has been granted study leave for one year from March 1959. He will be going to the Institute of Advanced Studies, Princeton University, where he will work on plasma physics. In Dr. Thonemann's absence the Harwell fusion programme will be carried forward by his deputy, MR. R. S. PEASE, under the supervision of MR. D. W. FRY, deputy director of Harwell with special responsibility for this work. Dr. Thonemann will be available for consultation.

● MAJ.-GEN. E. P. READMAN and MISS V. A. PEASE have been appointed directors of Amber Chemical Industries.

● MR. D. C. MCCULLOCH, 45 Grainger Park Road, Newcastle-upon-Tyne, who has represented Rhodes, Brydon and Youatt Ltd., makers of Mopump centrifugal pumps, Stockport, as sole agent for the past 22 years, is retiring at the end of this month. MR. M. J. B. HODGSON, B.Sc., has been appointed area manager to the newly established northern counties office at 60 Highbury, Jesmond, Newcastle-upon-Tyne 2, and is at present taking over from Mr. McCulloch.

● MR. A. W. KILLEEN has been appointed manager of the Leeds branch office of the British Aluminium Co. Ltd., Norfolk House, St. James's Square, London SW1, to succeed MR. A. E. HEELEY. Mr. Killeen will take up his duties on 1 November.

● MR. ALEC M. HUGHES, M.A., general secretary of the Scientific Film Association, has been invited to become visual aids officer of the British Association for the Advancement of Science. He will take up his new appointment in November.

● MR. R. C. AGABEG has been appointed assistant sales manager of the Chemicals Division of Union Carbide Ltd., 103 Mount Street, London W1, with effect from 6 October. Mr. Agabeg, a graduate of London University, was formerly employed with the sales development group of Monsanto Chemicals Ltd., and more recently as assistant development manager of their plastics division.

● MR. ROBIN MCLELLAN has been appointed representative in continental Europe of the recently created African Pyrethrum Technical Information Centre. APTIC, under the direction in London of DR. T. F. WEST, European Operations Executive, gives advice to insecticide manufacturers about uses of pyrethrum. It will shortly produce for manufacturers a 'recipe book' entitled African Pyrethrum Formulators' Manual.

● PROF. W. A. BAIN has resigned the chair of pharmacology at the University of Leeds to become director of the research institute of Smith, Kline and French, of Philadelphia.

● DR. T. FLITCROFT (Manchester) has been awarded the Imperial Chemical Industries' Research Fellowship in Chemistry at Dublin.

● At the dinner following the British Coal Utilisation Research Association's Seventh Coal Science Lecture, delivered by SIR CHARLES GOODEVE, director of the British Iron and Steel Research Association, the president of BCURA, DR. W. IDRIS JONES presented Sir Charles with the Coal Science Medal.

● MR. C. N. TAYLOR has been appointed home sales manager of British Titan Products Co. Ltd., and will operate from the London office at 10 Stratton Street, London W1.

● MR. T. STEWART, M.R.C.V.S., D.V.S.M., veterinary adviser to Benger Laboratories Ltd., has been invited to address the Dutch Veterinary Congress in Amsterdam. He is the only British speaker and is illustrating his lecture on the treatment of iron deficiency anaemia in pigs with a new film made by his company.

● DR. H. M. FINNISTON, who has been head of the metallurgy division at the UK Atomic Energy Research Establishment since the early days of the station's operation, is to join the Nuclear Power Plant Co.

● Sigmund Pumps Ltd. announce that MR. H. P. LORD, present general sales manager, has been appointed to the board.

Obituary

MR. T. H. KAYE, who was a director of Rose, Downs and Thompson Ltd., of Hull, chemical plant manufacturers in the Power-Gas Group, died on 16 October aged 69. He had been with the firm for 53 years and retired in 1956.

Commercial News

- **Greeff Maintain Ordinary Intrim at 5%**
- **Simon-Carves Bid for Lodge-Cottrell**
- **Booker Group Acquires Sigmund Pumps**
- **Rumianca Report Profit Rise for 1957**

Greeff-Chemicals Holdings

Greeff-Chemicals Holdings Ltd. have declared an interim ordinary dividend of 5 per cent (same), less tax, for the year ending 31 December 1958 which will be paid on 1 November.

P. Brotherhood

Machinery and power plant manufacturers, Peter Brotherhood Ltd., report that profits expanded from £375,778 to £532,758. After tax of £292,250 (£211,000) there is a net profit of £240,508, against £164,778. Dividend is being increased from 20 per cent to 24 per cent with a final of 18 per cent. In addition, a special 10 per cent bonus for the year ended 31 March 1958 is being paid.

Simon-Carves

Simon-Carves Ltd. have made a cash offer to acquire the whole of the issued capital of Lodge-Cottrell Ltd., manufacturers of electro-precipitation plants. The board of Lodge-Cottrell are recommending the offer to the company's shareholders for acceptance. (The offer is conditional upon acceptance by holders of at least 90 per cent or such less percentage as Simon-Carves may accept).

If the offer is accepted, it is intended to preserve the name of Lodge-Cottrell and to operate the company as a separate entity within the Simon-Carves organisation. The present precipitation division of Simon-Carves will continue to operate independently and will remain competitive in this field.

Expansion of both Lodge-Cottrell and Simon-Carves' own precipitation division is proposed. By pooling the research and development facilities of the two organisations, it is believed that even better service can be provided to the companies' numerous clients in a wide variety of industries, and that their operations can be still further extended to meet the requirements of the Clean Air Act.

Sigmund Pumps

Ninety per cent of the issued share capital of Sigmund Pumps Ltd., has been purchased from members of the Sigmund family and from the Industrial and Commercial Finance Corporation by Booker Engineering Holdings Ltd., (a member of the Booker Group of Companies).

Present management of Sigmund Pumps Ltd. (with their subsidiaries Small Bore Heating Systems Ltd., and Crewdson Hardy Ltd., makers of centrifugal pumping esuipment), will continue as at present at Team Valley, Gateshead. Managing director of the company, Mr. M. Sigmund retains a 10 per cent interest in the company and remains managing director.

The new board of Sigmund Pumps will consist of Mr. E. N. Robinson, chairman; Mr. M. Sigmund, managing director; Mr. G. R. Glendinning, secretary; Mr. D. W. L. Menzies, Mr. C. W. Tyrrell, Mr. P. Parker, and Mr. H. P. Lord.

Rumianca

The 1957 annual report of the Italian Rumianca chemical manufacturing concern, indicates that the company had an increased profit for the year of 698 million lire (603 million lire). A very satistory trading year had been experienced with the company's main products; these include caustic soda, chlorine, artificial fertilisers, DDT and chloride of lime. As the company did not consider it economic at the present time to expand production of agricultural chemicals, it had carried out a programme of co-operation with other companies, Italian and foreign, in the production of general chemicals.

These joint efforts took in the following: a sulphuric acid production scheme jointly with Quirina; agreement on the building of a plant at Varedo, together with the Italian Snia-Viscosa, for the production of carbon disulphide out of natural gas; decision taken to build, in co-operation with Squibb Italiana, Rome, and the Olin Mathieson Chemical Corporation, New York, a plant near Rome for the production of 30,000 metric tons a year of sodium phosphate for inland and export sale (this scheme will cost an estimated 3,000 million lire).

Rumianca also plan to modernise their own plants at Pieve Vergonte, Avenza and Borgaro and to set up facilities at them for the manufacture of new products in preparation for the European Common Market. Hitherto the plants have been producing soda and chlorine. This will cost an estimated 5,000 million lire. Rumianca's share capital at present stands at 10,000 million lire.

INCREASE OF CAPITAL

COMBUSTION CHEMICALS LTD. 37, King Street, WC2, increased by £900 beyond the registered capital of £100.

LONDON GAZETTE

Notice of a company voluntarily winding-up does not imply liabilities, it is purely formal and frequently is for purposes of internal reconstruction.

THE SHAW CHEMICAL CO. LTD., heavy chemical manufacturers, registered office, 66 Percy Road, Leicester. By special resolution, 10 October. Mr. B. F. Sharman, 1 Chatham Street, Granby Street, Leicester, appointed liquidator.

New Esso Research Centre

Lord Hailsham, in opening Esso's new £1,000,000 laboratories near Abingdon, Berkshire, discouraged hopes of any notable increase in Government expenditure to help industrial research, which, he said, should be primarily financed by industry.

Market Reports

IMPROVED OUTLOOK IS SUSTAINED

LONDON The better outlook on the industrial chemicals market, indicated last week, has been sustained with rather more activity on home account. Inquiry has been fairly well spread over the chief consuming industries, and with the possible exception of the textile and kindred trades there has been more interest in forward delivery dates.

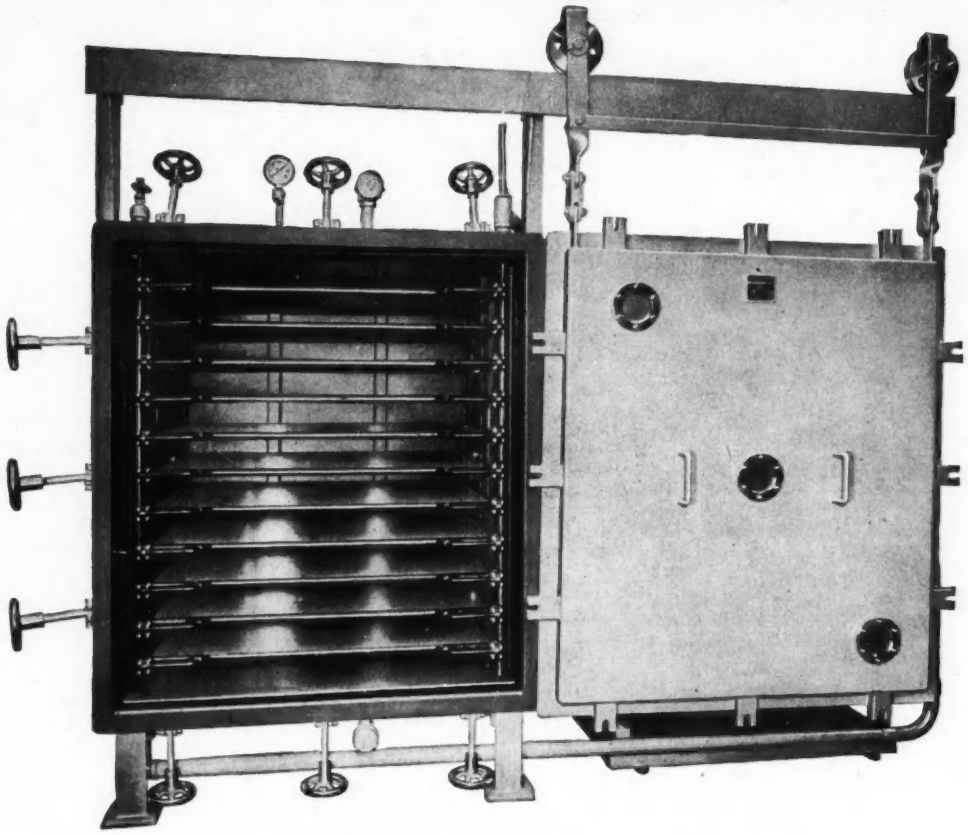
Prices generally are firm and unchanged except for some of the non-ferrous metal compounds which are dearer with the upward trend in metal prices. Copper sulphate has advanced to £76 per ton less 2 per cent f.o.b. Liverpool and the zinc oxides are dearer with the red seal quoted at £89 per ton for 2-ton lots. A further list of chemicals has been exempted from Key Industry Duty until the end of the year.

There has been no particular feature in the coal-tar products market and most items are moving in fair quantities.

MANCHESTER Fresh business in the general run of chemical products on the Manchester market during the past week has been steady, although home buyers still limit commitments to shorter delivery periods. Shipping business is fair. Prices remain steady to firm, the only change of note being a further advance in sulphate of copper to £76 per ton, less 2 per cent, f.o.b., a rise of £3 10s. Interest in fertilisers has been maintained at its recent level, while a fair movement is reported for the leading tar products.

GLASGOW Trading during the past week, as far as the Scottish heavy chemical market was concerned, has been fairly steady. Demands have been for reasonable quantities and have been well maintained with a fair number of inquiries of a varied nature. The tendency of prices has been towards firmness.

The interest shown last week on the agricultural side in regard to next season's requirements still continues. Inquiries are still being received showing more interest in export.



Araldite stands up to it

The new Apex 105E vacuum tray drier is coated internally with epoxy resin paint applied by M. E. Beswick Ltd., Byfleet. For this application, a paint based on Araldite 985E was chosen to provide a protective coating with outstanding adhesion to the metal walls. In common with all Araldite coatings, toughness is combined with flexibility, high resistance to corrosion and to wide variations of temperature and humidity.

Araldite

epoxy resins

Araldite is a registered trade name

Araldite epoxy resins are used

- ★ **for bonding metals, porcelain, glass, ceramics, etc.**
- ★ **for casting high grade solid electrical insulation.**
- ★ **for impregnating, potting or sealing electrical windings and components.**
- ★ **for producing glass fibre laminates.**
- ★ **for making patterns, models, jigs and tools.**
- ★ **as fillers for sheet metal work.**
- ★ **as protective coatings for metal, wood and ceramic surfaces.**

CIBA (A.R.L.) LTD., Duxford, Cambridge. Telephone: Sawston 2121.

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TRADE NOTES

High-vacuum Equipment Enquiries

W. C. Heraeus GmbH, of Hanau, Western Germany, announce that all enquiries from the UK for their high-vacuum equipment should be sent, as in the past, to their sole UK agents, Fleischmann (London) Ltd., Chancery House, Chancery Lane, London WC2.

Chemical Property For Sale

Freehold factories at 22 and 28 Marshgate Lane, Stratford, E15, formerly occupied by Hemingway and Co. Ltd., chemical manufacturers, are for sale in two lots by Chamberlain and Willows (Moorgate and Finsbury). The buildings have a total floor area of 160,000 sq. ft. and stand on riverside sites of about 4½ acres. They were withdrawn from auction earlier this year.

A & W Aluminium Compounds

Details of their wide range of aluminium compounds suitable for use in cosmetic formulations are published in booklet form by Albright and Wilson (Mfg) Ltd., 1, Knightsbridge Green, London SW1. The aluminium compounds described are aluminium chlorhydrate, aluminium chlorhydroxy-lactate, aluminium chloride, aluminium sulphate, aluminium sulphamate (basic) and aluminimum phenolsulphonate.

Butyl Rubber Prices Revised

Esso Petroleum's revised prices for Enjay butyl rubber are as follows: Regular grades, 1s 9½d per lb., duty paid, ex store; non-staining grades, 1s 10½d per lb., duty paid, ex store. These prices are applicable to any quantity.

Change of Address

As from Monday, 27 October 1958, F. A. Hughes (Cathodic Protection Division) of Devonshire House, Mayfair Place, Piccadilly, London W1, will be transferred to 4 Stanhope Gate, London W1. Telephone number Hyde Park 6080, telegraphic address Distancing Audley, London. The existing Telex address Bisolv, London 28739 will not be altered.

New Compound Fertiliser

A new granular compound fertiliser—KayNitro—is announced by Imperial Chemical Industries Ltd. It is suitable for use on grassland, and also on cereals and green crops. It contains 16 per cent nitrogen and 16 per cent potash (K_2O), but no phosphate. KayNitro is intended for use where phosphate is not required, for example, on land which has been well slagged and therefore has enough available phosphate.

Resilient Cold-Filling Compounds

Denso Mastics, produced by Winn and Coales Ltd., Denso House, Chapel Road, London SE27, are detailed in a new booklet issued by the company. Denso Mastics are a group of permanently resilient cold-filling and jointing compounds having anticorrosion properties. The same basic petrolatum composition incorporates inert siliceous fillers and corrosion inhibitors. The mastics are stated to be air-, gas- and water-proof, highly resistant to acids, alkalis and mineral salts and to neither harden or set. They can be cold-applied over a wide temperature range.

Cheaper Silastic LS-53

A 10 per cent reduction in the price of Silastic LS-53 has been announced by Midland Silicones Ltd. This reduction is in line with those of the Dow Corning Corporation of America who developed and manufactured Silastic LS-53.

DIARY DATES

TUESDAY, 28 OCTOBER

RIC—Chatham: Medway Tech. Coll., Maidstone Rd., 7 p.m. 'Recent advances in structural inorganic chemistry' by Prof. R. S. Nyholm.

RIC with Sheffield Metallurgy Club—Sheffield: British Iron and Steel Research Association, Hoyle St. 7 p.m. 'Some aspects of corrosion in the canning industry' by Dr. H. Liebmann.

I. Chem. E.—Chester: Blossoms Hotel, 7 p.m. 'Continuous manufacture of copper sulphate' by F. G. Molyneux.

WEDNESDAY, 29 OCTOBER

British Association of Chemists—London: Royal Society of Medicine (West Hall), 1, Wimpole Street, W1. 7 p.m. Presentation of Hinchley Memorial Address, 'Grant-aided research associations' by J. Wilson.

THURSDAY, 30 OCTOBER

SCI—Bristol: Chemistry Dept., University, Woodland Rd. 6.30 p.m. 'Transition metal complex hydrides' by Prof. G. Wilkinson.

SCI—Manchester: Chemistry Dept., University. 6 p.m. 'Petroleum chemicals for textiles and paper' by G. R. C. Tarring.

Fertiliser Society—London: Geological Soc., Burlington House, Piccadilly, W1. 2.30 p.m. 'Contact sulphuric acid plant, improved conversion by air dilution' by W. N. Hackett and Dr. R. W. Riding.

FRIDAY, 31 OCTOBER

RIC—London: St. Ermin's Hotel, Caxton St., SW1. 7 p.m. Tenth annual dinner and dance. Guest speakers The Rt. Hon. The Earl of Halsbury and Prof. W. Wardlaw.

SAC—Edinburgh: 22 George Square. 7 p.m. 'The analytical chemistry of phosphorus' by N. T. Wilkinson.

Stocks & Shares

Markets Remain Firm

MARKETS have again continued firm with the general undertone improving with every day's business. The last week has seen the return of option dealing which has commanded a considerable amount of attention.

Glaxo's preliminary results shocked the market. There seems no doubt that the investment potential of the company is very good. After the chairman's rather moderate interim statement last April, the results declared recently came as a surprise. Dividend has increased from 12½ to 17½ per cent with profits for the year up by 38 per cent to £5¾ million.

The latest increase in the dividend by no means exhausts the possibilities, for the business is still covered four times by earnings, allowing for the full participation of Allen and Hanburys shareholders, but excluding the bulk of the profits that will stem from the acquisition.

That is not to say that progress in the future will be as rapid as in the past, for in raising the payment from the equivalent of 2 per cent for 1948–49 to 17½ per cent, the directors have year by year distributed a larger proportion of earnings, the 1948–49 payments having been covered 16 times. The price of the shares have already risen from only 17s. 9d. in 1956 to 54s. 3d.

1958 High	1958 Low	Security	Price Oct. 18	Change on week
18/10½	13/4½	Albright & W. 5/–	18/3	+1½d.
23/–	16/9	Bakelite 10/–	22/9	+9d.
20/4½	14/10½	Borax Dfd. 5/–	16/9	+4½d.
17/–	10/4½	Bt. Glues 4/–	16/3	–3d.
7/7	6/1½	B.I. Plastics 2/–	7/9½	—
48/–	28/3	Bt. Xylonite	47/9	–1/3
66/3	45/9	Fisons	59/6	–6d.
55/–	31/6	Glaxo 10/–	54/3	–9d.
31/9	21/9	Hickson & W. 10/–	31/9	+6d.
35/3	24/3	ICI	33/11	+4½d.
4/3	2/7½	Kleemann 1/–	4/1½	—
13/6	14/–	Laporte 10/–	17/11½	+1½d.
16/2½	12/6	Monsanto 5/–	14/10	—
16/3	10/10½	Reichhold 5/–	16/–	—

British Chemical Prices

THE FOLLOWING are price changes recorded in the past month. The full CHEMICAL AGE table of British Chemical Prices was published in our issue of 26 July, p. 164. Other changes were recorded in CHEMICAL AGE as follows:—30 August, 27 September.

Copper sulphate. F.o.b., less 2 per cent. in 2-cwt. bags, £76.

Salicylic acid. Manchester: Tech., d/d, per lb., 2/4, 1-ton lots.

Tartaric acid. Per cwt.: 10 cwt. or more, £14 10s; 1 cwt., £14 15s.

Zinc oxide. Max. for 2-ton lots, d/d, white seal, £94; green seal, £92; red seal, £89.

NEW PATENTS

By permission of the Controller, HM Stationery Office, the following extracts are reproduced from the 'Official Journal (Patents)', which is available from the Patent Office (Sale Branch), 25 Southampton Buildings, Chancery Lane, London WC2, price 3s 3d including postage; annual subscription £8 2s.

Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period.

AMENDED SPECIFICATIONS

On Sale 26 November or as soon as possible thereafter

Aromatic vinyl compounds. Farbenfabriken Bayer. **690 352**

Stabilising liquid sulphur trioxide. Industrie Chimiche Dr. Baslini S.p.A., and anr. **780 627**

Extraction and purification of sapogenins. Glaxo Laboratories, Ltd. **797 384**

ACCEPTANCES

Open to public inspection 3 December

Production of uranium and to apparatus therefor. Imperial Chemical Industries, Ltd., and Crawford, J. W. C. **805 191**

Production of uranium. Imperial Chemical Industries, Ltd., and Wood, C. [Personal representative of Wood, T. K. (deceased)]. **805 192**

Electrodeposition of salts of plutonium. Kahn, M. **805 301**

Separation of plutonium. Scientific and Industrial Research, Honorary Advisory Council for **805 302**

Treatment of aqueous fission-product solutions. Boyer, T. W., MacHutchin, J. G., and Yaffe, L. **805 361**

Process for the manufacture of 3:3:5-trimethylcyclohexanol **805 157 & 805 158**

Manufacture of foam-generating substances. Minimax, Ltd. **805 220**

Sintering of powdered materials. Somogyi, F. P. **805 439**

Granular materials. Fisons, Ltd. **805 159**

Apparatus for the preparation and dispensing of liquids. Leach, H. C. **805 241**

Cyclic water-gas generators. Power-Gas Corporation, Ltd. **805 262**

Fertilisers. Fisons, Ltd. **805 160**

Thickened liquids, pastes, sludges and suspensions. Deutsche Gold- und Silber-Scheideanstalt Vorm, Roessler. **805 166**

Devices for measuring the temperature of gaseous fluids and in particular of flames. Office National d'Etudes et de Recherches Aeronautiques O.N.E.R.A. **805 123**

Organic acids. Merck Co., Inc. **805 295**

Optically active 7-carboethoxy-3-acetylthioheptanoic acids and their salts. Merck & Co., Inc. **805 296**

Refining of crude benzole. British Petroleum Co., Ltd., Northcott, R. P., and Lester, R [Cognate application 23 722] **805 304**

Preparing acetoxy derivatives of unsaturated esters. Rohm & Haas Co. **805 367**

Preservation of natural and synthetic rubbers, rubber articles and rubber latices. Imperial Chemical Industries, Ltd. [Addition to 763 283.] **805 368**

Preparation of cation-exchange resins. Permutit Co., Ltd. **805 322**

Plasticised polyvinyl resin compositions. Food Machinery & Chemical Corp. **805 252**

Cracking heavy hydrocarbon oils in a two-stage process. Esso Research & Engineering Co. **805 242**

Manufacture of combustible gas. Humphreys & Glasgow, Ltd. **805 130**

Dithiomalonic acid dimorpholide. Ruhrchemie A.G. **805 336**

Rendering organic fibrous materials water-repellent. Midland Silicones, Ltd. **805 372**

Process of preparing dry ammonium nitrate. Commercial Solvents Corp. **805 199**

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Preparation of alkyl mercuric salts. Farbenfabriken Bayer A.G. **805 15[illegible]**

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